Doc No. 1723-PS-0006
Issue 2

User Manual

MetPak Pro
Weather Station

MetPak Pro Part: 1723-PK-200
Serial Number 11270001 and higher
Firmware 2436 V2.01 and higher

Foreword

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Thank you for purchasing the MetPak Pro manufactured by Gill Instruments Ltd. To achieve optimum performance we recommend that you read the whole of this manual before proceeding with use.

Gill products are in continuous development and therefore specifications may be subject to change and design improvements without prior notice.

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Guarantee

For terms of guarantee, please contact your supplier.

Warranty is void if the coloured Wind Sensor security seal is damaged or broken, or the Wind Sensor transducer caps have been damaged.

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Cautions and Notes

The following symbols are used in this guide:

CAUTION. This indicates an important operating instruction that should be followed to avoid any potential damage to hardware or property, loss of data, or personal injury.

NOTE. This indicates important information to help you make the best use of this product.

Applicable Parts

MetPak Pro Part 1723-PK-200

Applies to:-

Serial Number 11270001 and higher.

Firmware 2436-V2.01 and higher.

Contents

1. Introduction 1

1.1 Principle of Operation 2
1.1.1 Wind Speed and Direction Sensor 2
1.1.2 Radiation Shield 3
1.1.3 Temperature and Relative Humidity Sensor with Dewpoint Output 3
1.1.4 Barometric Pressure 3
1.1.5 Sensor Inputs 3

1.2 Abbreviations 4

2. Installation 5

2.1 Pre-Installation Checks 5

2.2 Installation 6
2.2.1 Bench system test 6
2.2.2 Bench Test Equipment Required 6
2.2.3 Cabling 6
2.2.4 Communication and Power Connections 9
2.2.5 Analogue, Digital and PRT Input Connections 13
2.2.6 MetPak Pro System Connections 16
2.2.7 Mounting MetPak Pro 21
2.2.8 Mounting MetPak Pro Junction Box 23

3. Operation 25

3.1 Start Guide 25

3.2 MetView 27
3.2.1 Opening MetView 27
3.2.2 Scanning for Devices 28
3.2.3 The MetView Console 29
3.2.4 MetView Console Display Options 31
3.2.5 MetView Gauge Ranges and Graphs 32
3.2.6 Data logging 34

3.3 MetPak Pro Configuration 37

3.4 Configuring MetPak Pro with MetSet 40
3.4.1 Opening MetSet 40
3.4.2 MetSet Editing Screen 42
3.4.3 Monitoring MetPak Pro Output Data Using HyperTerminal. 45
3.4.4 Configuring MetPak Pro for SDI-12 47
3.4.5 SDI-12 Commands 47
3.4.6 Safe Mode 51

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4. Troubleshooting 55

4.1 Fault-Finding 55

4.2 Servicing 56

4.3 Bench Tests 56

5. Maintenance 57

6. Technical Information i

6.1 Specification i

6.2 MetPak Pro Hub PCB Connections iv

6.3 Electrical Conformity Certificate vi

Figures

Figure 1 MetPak Pro 1
Figure 2 Compass points 2
Figure 3 Position of Temperature and Relative Humidity Probe in the Radiation Shield 3
Figure 4 Internal view of the hub box 9
Figure 5 Hub Box with Analogue and Digital Pec fitted. 10
Figure 6 Connection of Gill USB Cable (Part No. 1723-10-051) 10
Figure 7 RS232 connections 11
Figure 8 RS422 connections 11
Figure 9 RS485 Connections 12
Figure 10 SDI-12 connections 12
Figure 11 Correct mounting position for MetPak Pro 22
Figure 12 Opening MetSet Screen 40

Tables

Table 1 Abbreviations 4
Table 2 Recommended Belden cable types 7
Table 3 Maximum cable lengths for supported communication and sensor network 7
Table 4 Default configuration settings 37
Table 5 MetPak Pro Commands 46
Table 6 Abbreviations used in UNIT configuration command 46
Table 7 Common problems and their solution 55
Table 8 Status codes as output with the MetPak Pro data string 56
Table 9 HygroClip connections (6-way connector J1) iv
Table 10 WindSonic anemometer connections (8-way connector J4) iv
Table 11 PC communications (8-way connector, J5) v
Table 12 PRT Sensor (4-way connector, J7) v
Table 13 Digital Switch Input (2-way connector, J8) v
Table 14 Analogue Sensors Input (8-way connector, J9) v

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1. Introduction

MetPak Pro is a compact and lightweight multi-sensor instrument that measures the most essential weather parameters. It also provides a data collection system that allows customers to add their own selection of sensors to meet local requirements. Gill ultrasonic technology, as used in the proven WindSonic instrument, measures wind speed and direction. Temperature and Humidity are measured and Dewpoint calculated using an industry standard probe housed in a naturally aspirated radiation shield. Barometric pressure is measured using an industry standard sensor.

The customer is able to add up to four additional sensors. One PRT (temperature sensor), one digital (contact closure rain gauge) and two analogue inputs (4-20mA or 0-5V) e.g. water level sensor, pyranometer, pressure sensor, soil temperature etc. Other types of sensors may be added limited by the number of inputs available.

The MetPak Pro combines all the instrument data into a single combined data string. This may be configured for digital ASCII RS232/RS422/RS485 (2 wire point to point) and digital SDI-12 outputs.

The instrument uses a rugged U-bolt mounting clamp that attaches to any vertical pipe up to 50mm (2 inch) diameter.

An electrical Hub box is fitted to the mounting bracket for termination of sensors limited to 1 cable gland entry, data and power cables.

A separate Junction box is available for easier termination of external sensors, power and communication cables.

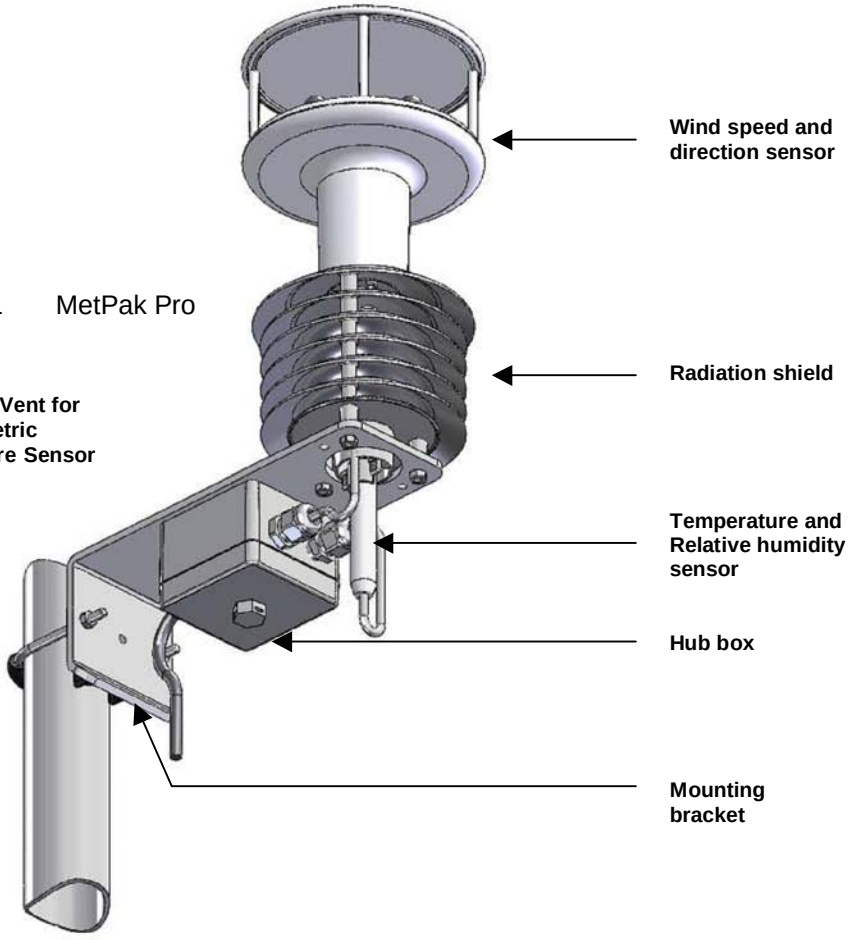

Figure 1 MetPak Pro

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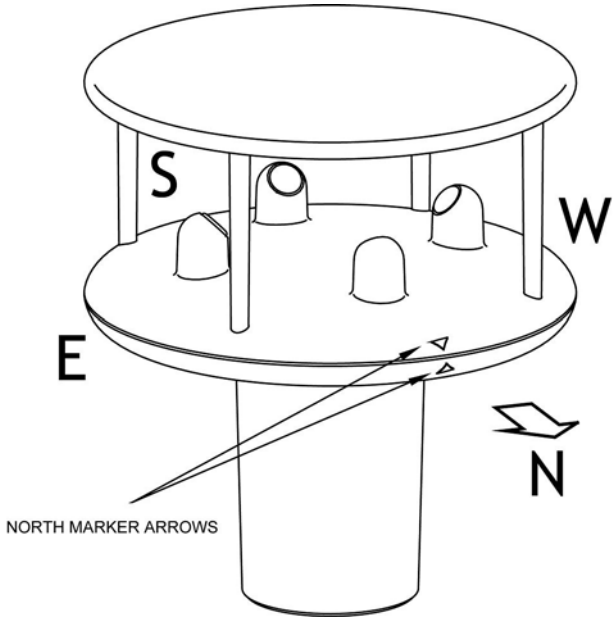
1.1 Principle of Operation

1.1.1 Wind Speed and Direction Sensor

The MetPak Pro uses the WindSonic wind speed and direction sensor. The WindSonic measures the times taken for an ultrasonic pulse of sound to travel from the North transducer to the South transducer, and compares it with the time for a pulse to travel from S to N transducer. Likewise times are compared between West and East, and E and W transducer.

If, for example, a North wind is blowing, then the time taken for the pulse to travel from N to S will be faster than from S to N, whereas the W to E, and E to W times will be the same. The wind speed and direction can then be calculated from the differences in the times of flight on each axis. This calculation is independent of factors such as temperature.



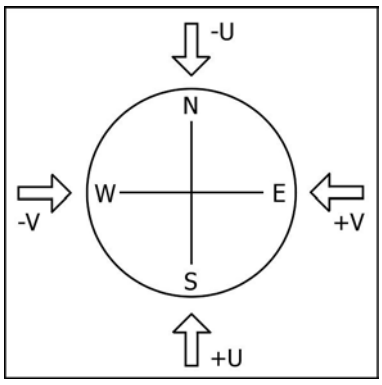


Figure 2 Compass points

Figure 2 shows the compass point and polarity of U and V if the wind components along the U and V axis are blowing in the direction of the respective arrows.

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1.1.2 Radiation Shield

The Multi-Plate Radiation Shield protects temperature and relative humidity sensors from error-producing solar radiation and precipitation. This shield relies on a combination of plate geometry, material and natural ventilation to provide effective shielding.

1.1.3 Temperature and Relative Humidity Sensor with Dewpoint Output

The Rotronic HygroClip module is a complete instrument, with integrated temperature compensation. Calibration data is maintained within the integrated electronics. It provides digital output signals for Relative Humidity, Temperature and Dewpoint to the MetPak Pro Hub box.

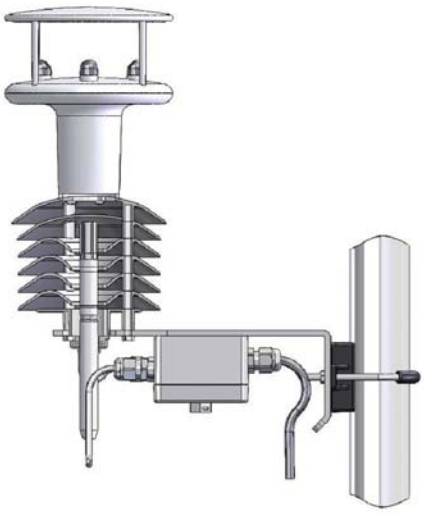

Figure 3 Position of Temperature and Relative Humidity Probe in the Radiation Shield

1.1.4 Barometric Pressure

Barometric pressure output is provided by a solid-state device fitted on to the circuit board in the MetPak Pro Hub box. Vent to atmosphere is via a Gortex filter which also protects the pressure sensor from the effects of wind and rain.

1.1.5 Sensor Inputs

Two analogue inputs, 0-5V or 4-20mA (loop or self-powered).

One four wire PRT 100 input conforming to IEC 60751.

One Digital input, detects when two dedicated terminals are short circuited (less than 1k ohm).

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1.2 Abbreviations

Table 1 Abbreviations

Item	Meaning
ASCII	American Standard Code for Information Interchange
C	Centigrade
CAL	Calibration
CD	Compact Disc
COM	Communications
CR	Carriage Return
CSV	Comma Separated Variable
ETX	End of String
F	Fahrenheight
FPM	Feet per Minute
HF	High Frequency
HPA	Hecto-Pascals
HTML	Hyper Text Markup Language
Hz	Hertz
IMM	International Maritime Mobile
In Hg	Inches of Mercury
K	Kelvin
KPH	Kilometres per Hour
KTS	Knots
LF	Line Feed
M Bar	Milli Bars
Max	Maximum
MF	Medium Frequency
Min	Minimum
Mm Hg	Millimetres of Mercury
MPH	Miles per Hour
MS	Microsoft
MS	Metres per Second
NSEW	North South East West
NVM	Non-Volatile Memory
PC	IBM compatible Personal Computer
ROM	Read Only Memory
RS232	Communications standard
RS422	Communications standard
Rx	Receive
RXD	Received Data
SDI-12	Serial – Data Interface standard for microprocessor based sensors
STX	Start of String
Tx	Transmit
TXD	Transmitted Data
VHF	Very High Frequency
WMO	World Meteorological Organisation

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2. Installation

MetPak Pro has been designed to meet and exceed the stringent standards listed in its specification (see Para 6.1).

2.1 Pre-Installation Checks

As with any sophisticated electronics, good engineering practice should be followed to ensure correct operation:

- Ensure the MetPak Pro will not be affected by other equipment operating locally, which may not conform to current standards, e.g. radio/radar transmitters, generators etc.
- Avoid mounting in the plane of any radar scanner – a vertical separation of at least 2m should be achieved.
- When installing MetPak Pro near radio transmitting antennas, ensure that the mounting position fulfills the following minimum separations (all round):
- VHF IMM – 1m
- MF/HF – 5m
- Satcom – 5m (avoid likely lines of sight)
- Use cables recommended by Gill (see Para 2.2.3). If cables are cut and re-connected incorrectly (perhaps in a junction box) then EMC performance may be compromised if cable screen integrity is not maintained.
- Avoid earth loops – wire the system in accordance with these installation guidelines.
- Ensure that the power supply operates to the MetPak Pro specification (see Para 6.1) at all times.
- Avoid turbulence caused by surrounding structures that will affect the accuracy of the sensors such as trees, masts and buildings. The WMO make the following recommendations. The standard exposure of wind instruments over level open terrain is 10m above the ground. Open terrain is defined as an area where the distance between the sensor and any obstruction is at least 10 times the height of the obstruction.
- Keep away from building exhaust vents, machinery and motors.

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2.2 Installation

2.2.1 Bench system test

Prior to physically mounting the MetPak Pro in its final location, we strongly recommend that a bench system test is carried out to confirm the system is configured correctly, is fully functional and electrically compatible with the selected host system and cabling (preferably utilising the final cable length). The required data format, units, output rate, and other options should also all be set up at this stage.

2.2.2 Bench Test Equipment Required

1723-PK-200	MetPak Pro set for RS232 communication (factory default setting).
1723-10-051	MetPak Pro RS232 to USB 1.8M configuration cable with integral 5v power or alternatively use RS232, RS232 converter and separate 5v to 30 dc power supply.
ES-U-1001-A	EasySynch RS232 to USB adaptor or equivalent (if not using Gill part 1723-10-051) or connect directly to an RS232 COM port.

Power Supply 5V to 30Vdc at 100mA if required.

Belden 9503 3 pair communications and power cable (if not using Gill Part 1723-10-051), length as required.

Belden cable with up to 6 pairs for Analogue, Digital and PRT inputs.

Gill MetSet Software supplied on the MetPak Pro CD or download from. http://www.gill.co.uk/main/software.html

2.2.3 Cabling

MetPak Pro has five communication connection options:

- USB (using the 1.8m Gill USB cable, Part No. 1723-10-051).
- RS232
- RS422
- RS485 (two wire point to point).
- SDI-12

MetPak Pro has various Sensor Input connection options:

- 0-5v
- 4-20mA
- PRT.
- Digital Switch

It is important that the cable is appropriate for the chosen connection option. The following sections describe the recommended types and maximum lengths of cable in each case.

NOTE. A 15-metre, 6-pair cable (wires stripped at each end) suitable for RS232/RS422 or SDI-12 communication is available from Gill Instruments (Part No. 1723-10-053).

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Cable Type

Wire type: 24AWG

Wire size: 7x32 AWG.

Cable outer diameter: 6-8mm (to match the hub box gland).

For RS422/485 operation the cable should contain twisted pairs screened to match the application.

The following table shows an example manufacturers' reference; other manufacturers' equivalents can be used.

Table 2 Recommended Belden cable types

Application	No. of Pairs	Belden Ref.
SDI-12 or RS485	2	9729
Digital RS232	3	9503
Digital RS422	4	9504
Multiple External Sensors	6	9506

Cable length

The maximum cable length is dependent on the chosen communication method.

The following table shows the maximum cable lengths for the supported communication protocols at the given baud rates, using the recommended cable. If any problems of data corruption etc are experienced, then a slower baud rate should be used. Alternatively, a higher specification cable can be tried.

Table 3 Maximum cable lengths for supported communication and sensor network

Communication format	Baud rate	Max. cable length
RS232	19200	6.5M
RS422/485	19200	1000M
SDI-12	1200	90M
0-5v Analogue Input	Not Applicable	Refer to user Analogue Sensor data sheet
4-20mA Analogue Input	Not Applicable	Refer to user Analogue Sensor data sheet
Digital Switch Input	Not Applicable	Switch contact and cable resistance to be less than 1k ohm
PRT Input	Not Applicable	Refer to user PRT data sheet

Cabling (unused wires)

Any unused wires in the connecting cables should be connected to ground preferably at the user equipment end.

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Cabling protection

The Cable should be secured:

- With cable clamps or equivalent at regular intervals such that the hub box cable gland does not support the cable weight.
- Away from the mounting U bolts to prevent chaffing of the cable.

NOTE. Install appropriate strain relief support to the cable. If possible, pass the cable through the mounting pole.

Earthing

To ensure correct operation and for maximum protection from lightning, a separate lightning rod system is recommended to protect the system.

You can also earth the MetPak Pro through its mountings or by connecting a grounding cable (minimum of 6mm² copper wire) to a spare MetPak Pro metalwork bolt hole. Clean off any paint that might prevent a good connection.

When you connect the communications cable ensure that the screen has a connection to the hub box case.

The Junction Box accessory has a plastic case, hence ensure continuity of cable screens into and out of the Junction Box using the common earthing terminals provided in the box.

Routing Cables through the Hub Box Glands

NOTE: The MetPak Pro Hub Box cable glands contain spring loaded metal leaves that are designed to make a ground contact with cables that have an overall braid screen. Care is therefore required when inserting and removing cables through the glands to prevent damage to the metal leaves.

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2.2.4 Communication and Power Connections

To connect the MetPak Pro Power and Communications cable:

1. Open MetPak Pro's hub box by unfastening the four screws.
2. Locate connector J5 (see Figure 4). Carefully pull the connector off its circuit board pins.
3. Strip the cable wires to 8mm.
4. Pass the cable through one of the gland nuts (please refer to the 2nd NOTE on Page 8).
5. Connect your cable as shown in the following diagrams:
   - Gill USB Cable — Figure 6
   - RS232 — Figure 7
   - RS422 — Figure 8
   - RS485 — Figure 9
   - SDI-12 — Figure 10
6. Attach the cable's screen wires to the terminal post (see Figure 4).
7. After connection, securely tighten the gland nut to prevent moisture ingress.

NOTE. Ensure that MetPak Pro is configured for the chosen communications method

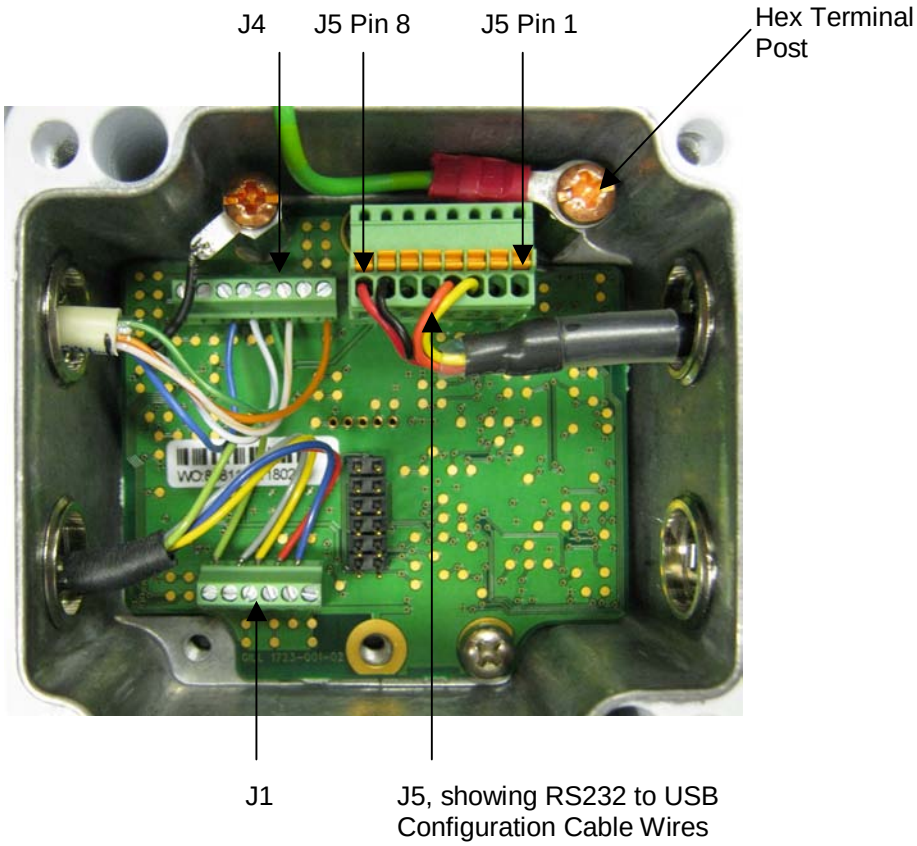

Figure 4 Internal view of the hub box

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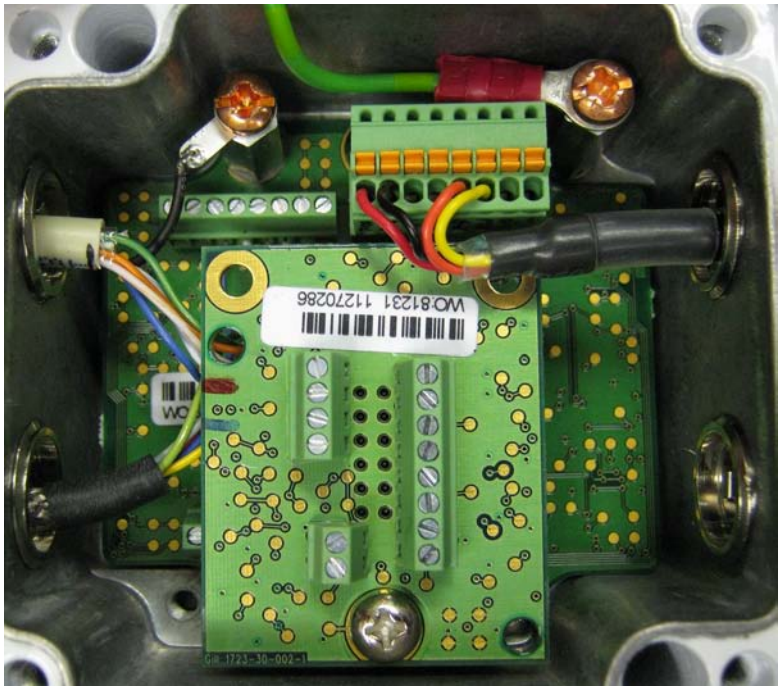
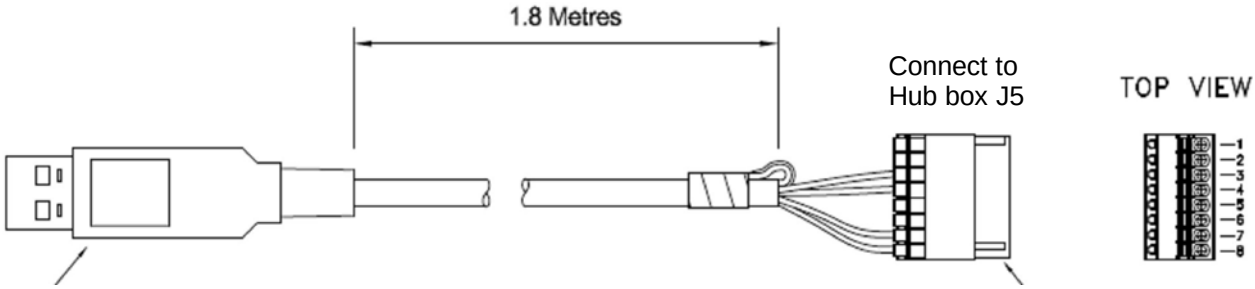


Figure 5 Hub Box with Analogue and Digital Pec fitted.

USB Lead Connection (COMMS set for RS232)



Connect MetPak Pro to a PC USB port using the Gill Configuration Cable 1723-10-051.

J5 Pin	1	2	3	4	5	6	7	8
Colour	None	None	Yellow	Orange	None	None	Black	Red

Figure 6 Connection of Gill USB Cable (Part No. 1723-10-051)

Digital Output RS232 Connections (COMMS set for RS232)

This is the MetPak Pro default communication configuration setting.

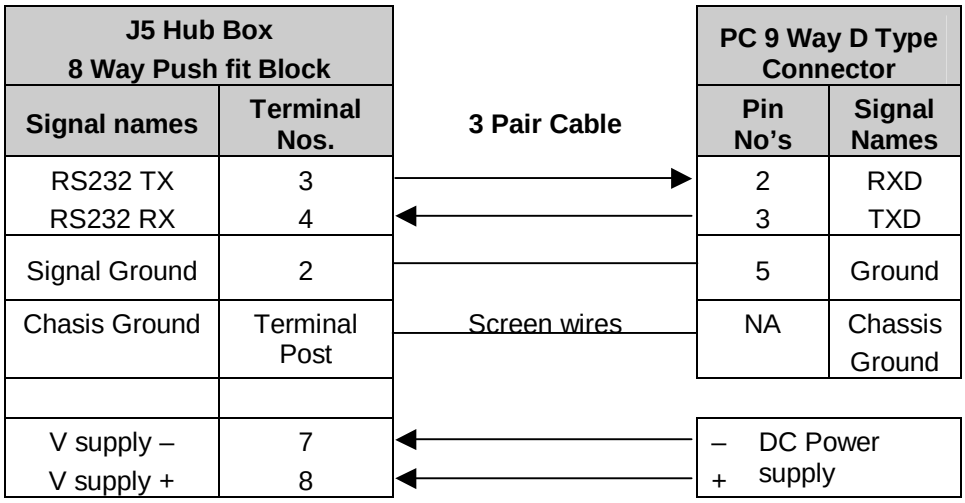


Figure 7 RS232 connections

Digital Output RS422 Connections (COMMS set for RS422)

This is not the default communications setting; ensure the MetPak Pro has been configured for this output requirement before wiring to a user device.

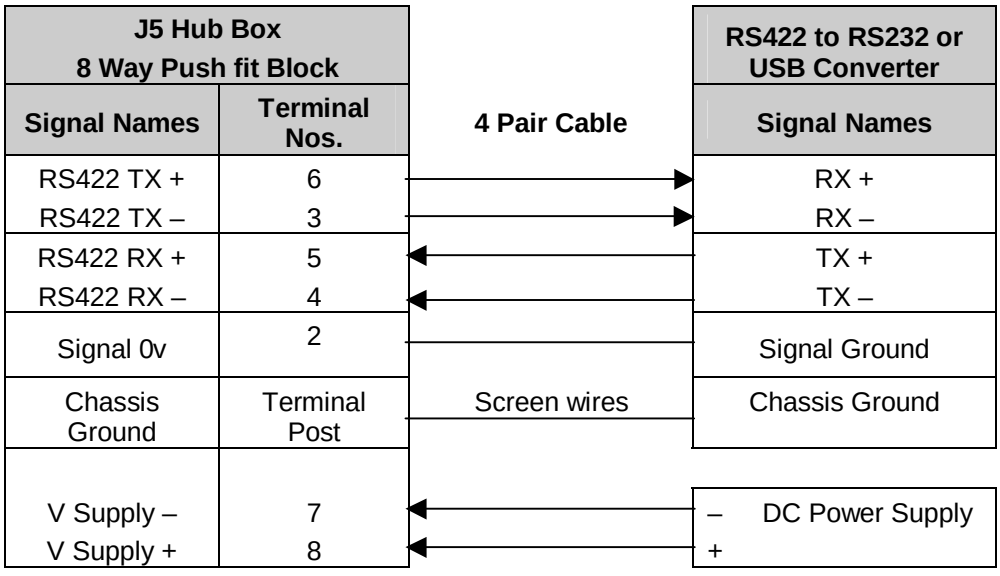


Figure 8 RS422 connections

Digital Output RS485S 2 Wire Point to Point Connections (COMMS set for RS485P2W)

This is not the default communications setting; ensure the MetPak Pro has been configured for this output requirement before wiring to a user device.

Note that it is not possible to network other devices on this 2-wire RS485 link.

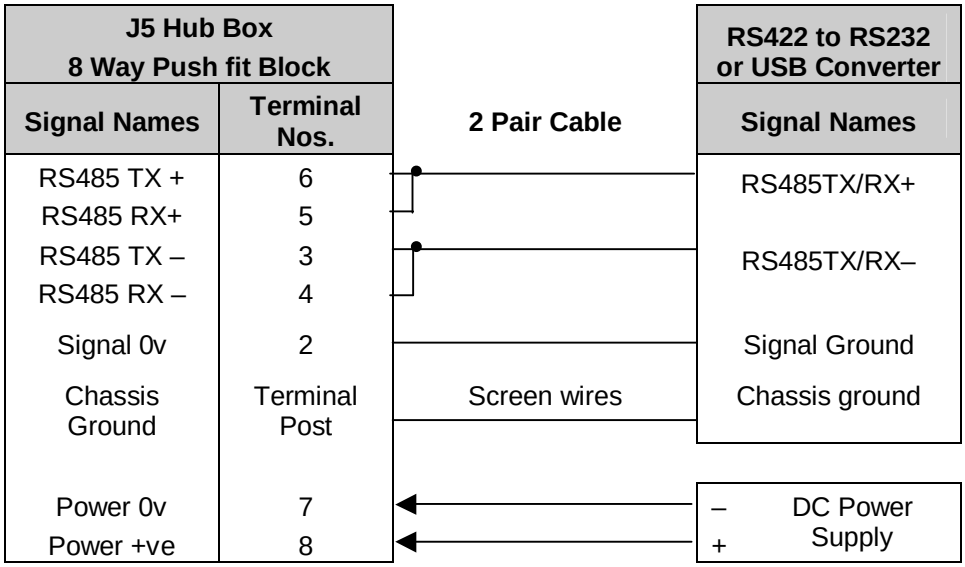


Figure 9 RS485 Connections

Digital Output SDI-12 Connections (COMMS set for SDI12)

This is not the default communications setting; ensure the MetPak Pro has been configured for this output requirement before wiring to a user device.

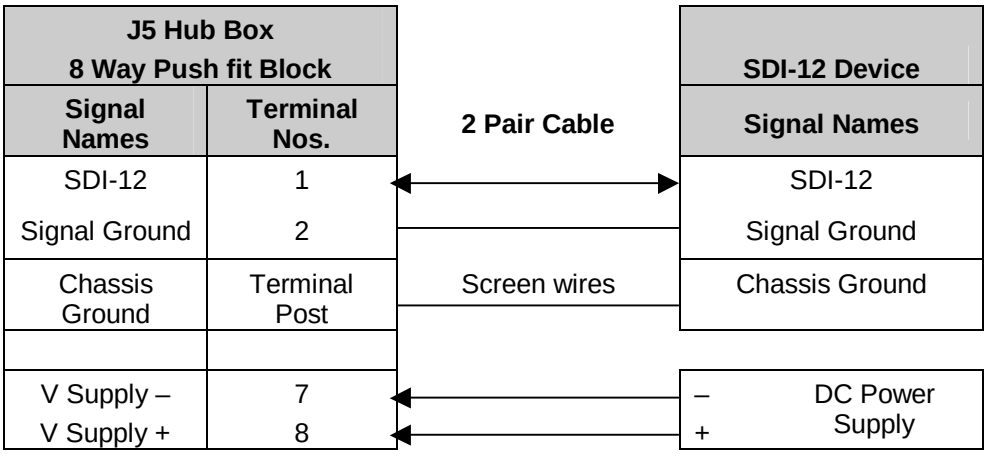


Figure 10 SDI-12 connections

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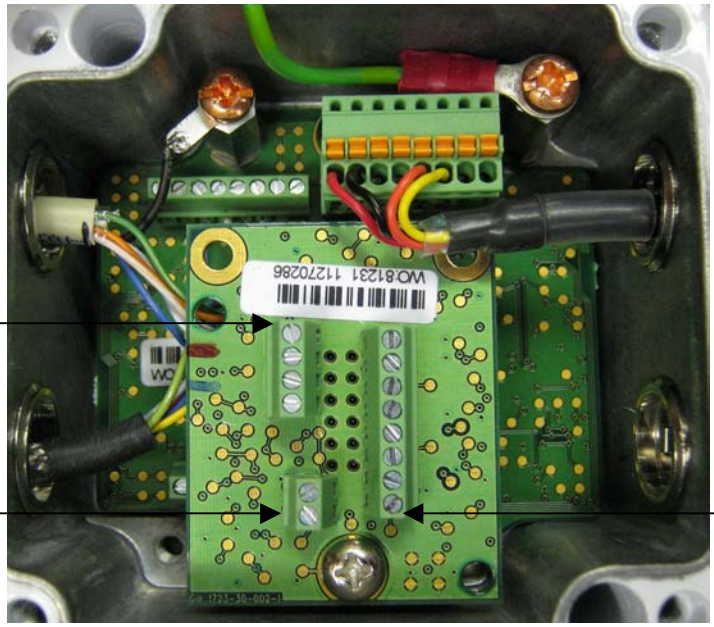
2.2.5 Analogue, Digital and PRT Input Connections



Analogue 0-5 volt Input Connections

This is not a default setting; ensure the MetPak Pro has been configured for this input requirement before wiring sensors to the MetPak Pro.

(See Figures 6 to 10 above for Power and Communication Connections).

J9 Hub Box 8 Way Terminal Block		Cable	0-5V Voltage Output Sensors
Signal Names	**Terminal Nos.**		**Signal Names**
VI 1	1	←	Voltage Out 1
GND	2	←	Ground
VI 2	3	←	Voltage Out 2
GND	4	←	Ground
Chassis Ground	Terminal Post	Screen wires ←	Chassis Ground

Analogue 4-20mA Input Connections (Sensor Powered)

This is not a default setting; ensure the MetPak Pro has been configured for this input requirement before wiring sensors to the MetPak Pro.

See Figures 6 to 10 above for Power and Communication Connections).

J9 Hub Box 8 Way Terminal Block			4-20mA Current Sensors (Sensor Powered)
Signal Names	**Terminal Nos.**	**Cable**	**Signal Names**
II 1	6	←	Current 1
GND	2	→	Ground
II 2	8	←	Current 2
GND	4	→	Ground
Chassis Ground	Terminal Post	Screen wires	Chassis Ground

Analogue 4-20mA Input Connections (MetPak Pro Powered)

This is not a default setting; ensure the MetPak Pro has been configured for this input requirement before wiring sensors to the MetPak Pro.

See Figures 6 to 10 above for Power and Communication Connections).

J9 Hub Box 8 Way Terminal Block			4-20mA Current Sensors (MetPak Pro Powered)
Signal Names	**Terminal Nos.**	**Cable**	**Signal Names**
II 1	6	←	Current 1
IL Supply	5	→	Sensor Power In
II 2	8	←	Current 2
IL Supply	7	→	Sensor Power In
Chassis Ground	Terminal Post	Screen wires	Chassis Ground

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Digital Switch Connection (Rain Gauge)

This is not a default setting; ensure the MetPak Pro has been configured for this input requirement before wiring sensors to the MetPak Pro.

See Figures 6 to 10 above for Power and Communication Connections).

J8 Hub Box 2 Way Terminal Block			Digital Switch e.g. Rain Bucket
Signal Names	**Terminal Nos.**	**Cable**	**Signal Names**
DIG 1	2	←	Switch Contact
GND	1	→	Return Switch Contact
Chassis Ground	Terminal Post	Screen Wire	Chassis Ground

Platinum Resistance Thermometer (PRT) Input

This is not a default setting; ensure the MetPak Pro has been configured for this input requirement before wiring sensors to the MetPak Pro.

See Figures 6 to 10 above for Power and Communication Connections).

J7 Hub Box 4 Way Terminal Block			PRT Sensor
Signal Names	**Terminal Nos.**	**Cable**	**Signal Names**
PWR +ve (Power to PRT)	1	→	PRT Excitation +ve
PRT+	2	←	PRT Sense + Output
PRT-	3	←	PRT Sense - Output
GND (PRT Power Ground)	4	→	PRT Excitation -ve
Chassis Ground	Terminal Post	Screen Wire	Chassis Ground

2.2.6 MetPak Pro System Connections

A Typical MetPak Pro system might look like the following illustration.

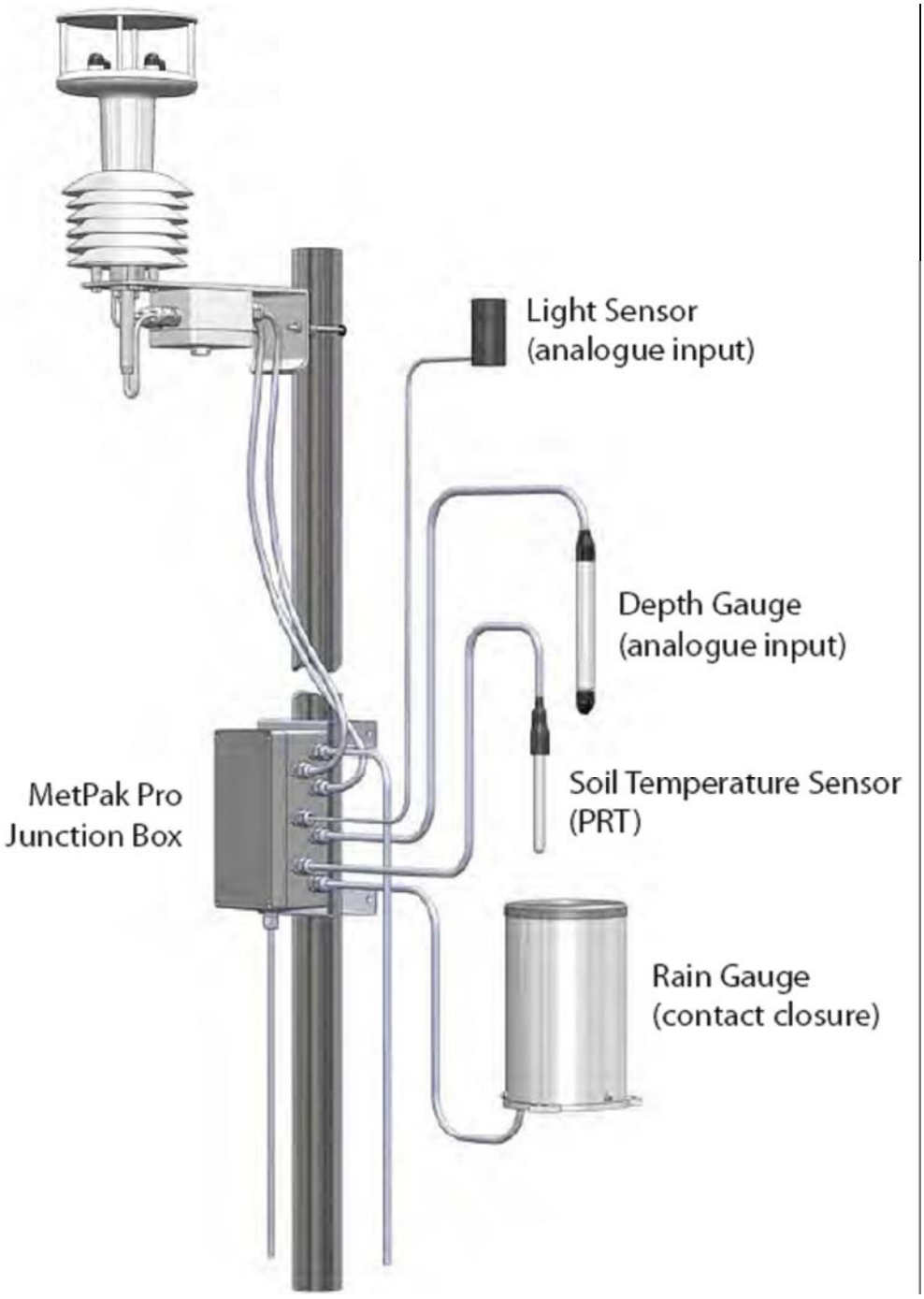

Figure 11 MetPak Pro Example System Picture

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MetPak Pro Junction Box Accessory

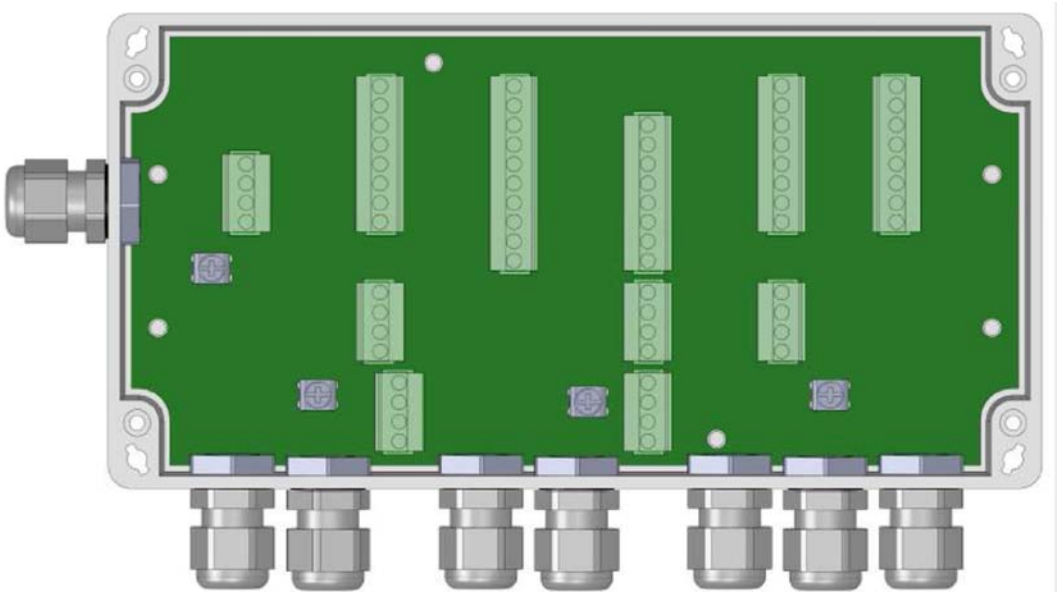
As part of a MetPak Pro system Gill Instruments can provide a Junction Box containing a pcb with removable terminal connectors and optional mounting hardware to provide a means of connecting external sensor and MetPak Pro wiring at a convenient common point.

Alternatively the pcb with removable terminal connectors can be supplied as a standalone item for mounting in a customer supplied box.

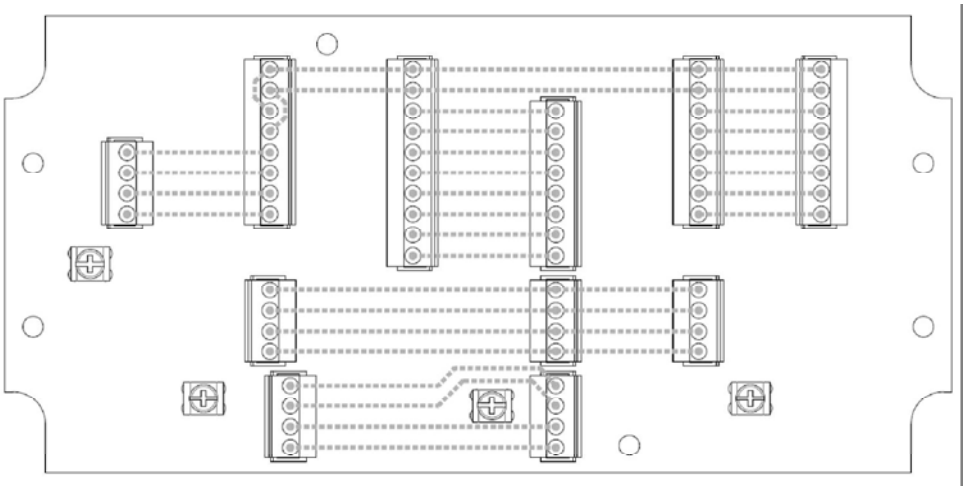
Junction Box parts if required are:

1723-PK-201	Junction Box with internal terminating pcb.
1723-PK-202	Terminating pcb (to mount in customer box).
1723-PK-204	Pack of 4 feet for Panel Mounting the Junction Box.
1723-PK-203	Pack of 4 brackets for Pole Mounting the Junction Box.

Junction Box 1723-PK-201 (containing Terminating pcb 1723-PK-202)



Junction Box terminating pcb circuit track layout



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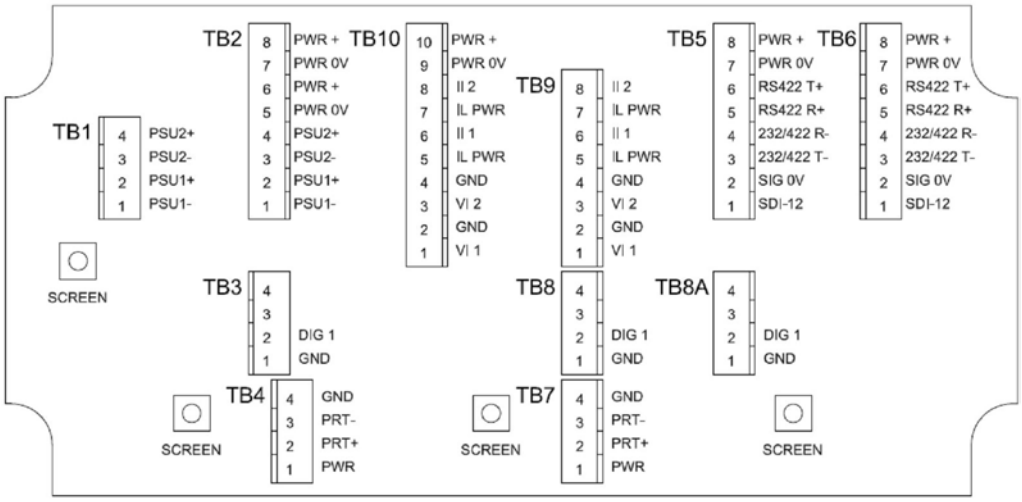
Junction Box Terminal Block Connections



Note that the Junction box glands will accept cables with an outer diameter between 3-10mm. If a smaller diameter cable is to be used bulk out with heat shrink or suitable sleeve to ensure the gland can secure the cable and provide an environmental seal.

Communication System Connections

Only connect cables that meet the required data interface requirement (e.g. RS232 etc).

MetPak Pro Hub Box Connector J5		Hub to Junction Box Cable	MetPak Pro Junction Box TB5	MetPak Pro Junction Box TB6	Junction Box to User Cable	User PC/Logger Interface
Signal Name	Terminal Number		Signal Name	Signal Name		Signal Name
SDI-12 TX/RX	1		SDI-12	SDI-12		SDI-12
Signal 0v	2		SIG 0v	SIG 0v		SIG 0v
RS232/422/485 TX-	3		232/422 T-	232/422 T-		232/422 R-
RS232/422 RX-	4		232/422 R-	232/422 R-		232/422 T-
RS422 RX+	5		RS422 R+	RS422 R+		422 T+
RS422/485 TX+	6		RS422 T+	RS422 T+		422 R+
Supply 0v	7		PWR 0v	PWR 0v		PWR 0v
Supply +ve	8		PWR +	PWR +		PWR +
Chassis	Terminal Tag	Screen	Screen Tag	Screen Tag	Screen	Screen Tag

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4-20mA Current Sensor System Connections (Sensor Powered)

MetPak Pro Hub Box Connector J9		Hub to Junction Box Cable	MetPak Pro Junction Box TB9	MetPak Pro Junction Box TB10	Junction Box to User Cable	User Current Interface
Signal Name	Terminal Number		Signal Name	Signal Name		Signal Name
II1	6		II1	II1		II1
GND	2		GND	GND		GND
II 2	8		II 2	II 2		II2
GND	4		GND	GND		GND
Chassis	Terminal Tag	Screen	Screen Tag	Screen Tag	Screen	Screen Tag

4-20mA Current Sensor System Connections (MetPak Pro Powered)

MetPak Pro Hub Box Connector J9		Hub to Junction Box Cable	MetPak Pro Junction Box TB9	MetPak Pro Junction Box TB10	Junction Box to User Cable	User Current Interface
Signal Name	Terminal Number		Signal Name	Signal Name		Signal Name
II1	6		II1	II1		II1
IL PWR	5		IL PWR	IL PWR		IL Power
II 2	8		II 2	II 2		II2
IL PWR	7		IL PWR	IL PWR		IL Power
Chassis	Terminal Tag	Screen	Screen Tag	Screen Tag	Screen	Screen Tag

0-5 Volt Voltage Sensor System Connections

MetPak Pro Hub Box Connector J9		Hub to Junction Box Cable	MetPak Pro Junction Box TB9	MetPak Pro Junction Box TB10	Junction Box to User Cable	User Voltage Interface
Signal Name	Terminal Number		Signal Name	Signal Name		Signal Name
VI 1	1		VI 1	VI 1		V Out 1
GND	2		GND	GND		Ground
VI 2	3		VI 2	VI 2		V Out 2
GND	4		GND	GND		Ground
Chassis	Terminal Tag	Screen	Screen Tag	Screen Tag	Screen	Screen Tag

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Digital Switch Sensor System Connections

MetPak Pro Hub Box Connector J8		Hub to Junction Box Cable	MetPak Pro Junction Box TB8 or TB8A	MetPak Pro Junction Box TB3	Junction Box to User Cable	User Switch Interface
Signal Name	Terminal Number		Signal Name	Signal Name		Signal Name
DIG 1	2		DIG 1	DIG 1		Contact
GND	1		GND	GND		Contact
Chassis	Terminal Tag	Screen	Screen Tag	Screen Tag	Screen	Screen Tag

PRT System Connections

MetPak Pro Hub Box Connector J7		Hub to Junction Box Cable	MetPak Pro Junction Box TB7	MetPak Pro Junction Box TB4	Junction Box to User Cable	User PRT Interface
Signal Name	Terminal Number		Signal Name	Signal Name		Signal Name
PWR+ve	1		PWR+ve	PWR+ve		PRT Excitation +ve
PRT+	2		PRT+	PRT+		PRT Sense + Output
PRT-	3		PRT-	PRT-		PRT Sense - Output
PRT GND	4		GND	GND		PRT Excitation -ve
Chassis	Terminal Tag	Screen	Screen Tag	Screen Tag	Screen	Screen Tag

External Power Supply Connections

User Power Supplies	User to Junction Box Cable	MetPak Pro Junction Box TB1	MetPak Pro Junction Box TB2	Cable to Sensors	User Sensor Supplies
Signal Name		Signal Name	Signal Name		Signal Name
PSU1 +ve		PSU1 +ve	PSU1 +ve		PSU1 +ve
PSU1 –ve		PSU1 –ve	PSU1 –ve		PSU1 –ve
PSU2 +ve		PSU2 +ve	PSU2 +ve		PSU2 +ve
PSU2 -ve		PSU2 -ve	PSU2 -ve		PSU2 -ve
Chassis	Screen	Screen Tag	Screen Tag	Screen	Screen Tag

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2.2.7 Mounting MetPak Pro

MetPak Pro uses a U-bolt mounting clamp suitable for attaching to a vertical pipe with a diameter of 25-50mm. When mounting MetPak Pro, consider the position, orientation and alignment of the unit.

Position

It is the responsibility of the customer to ensure that the MetPak Pro is mounted in a position clear of any structure, including the mounting post, which may obstruct the airflow or induce turbulence.

CAUTION. Do NOT mount the MetPak Pro in close proximity to high-powered radar or radio transmitters. A site survey may be required if there is any doubt about the strength of external electrical noise.

The temperature and humidity probe is mounted inside the radiation shield as shown in

Figure 3.

Orientation

Normally, the MetPak Pro is mounted on a vertical pole, ensuring a horizontal Measuring Plane (see Figure 12).

For indoor use the unit may be mounted with the Measurement Plane set to any required orientation.

Alignment

The MetPak Pro should be aligned to point to North, or other required reference direction.

There are two arrows, a coloured rectangle, and an alignment notch to aid alignment.

Note. It is usually simpler to work first with a compass at ground level and identify a suitable landmark and it's bearing.

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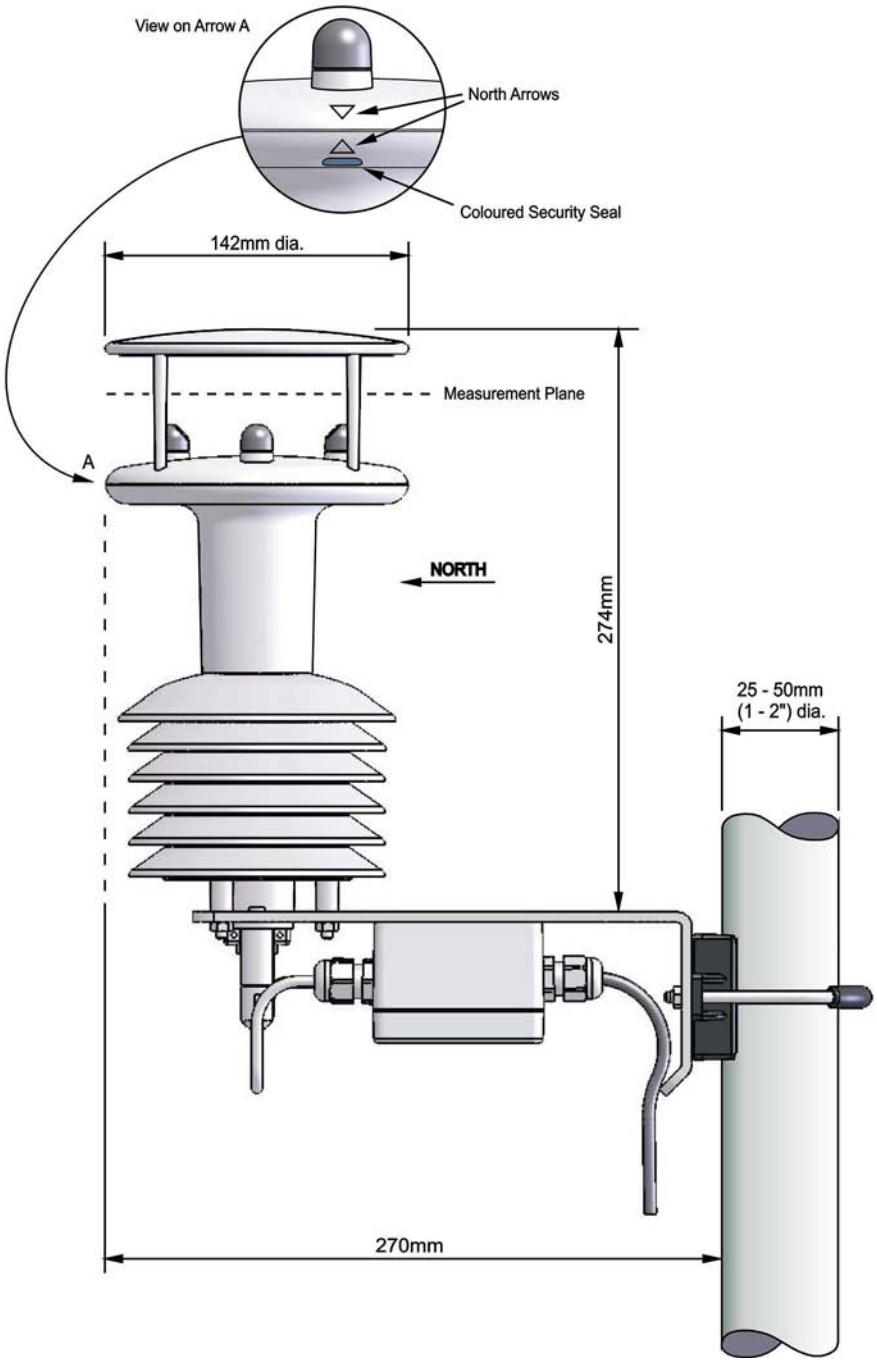


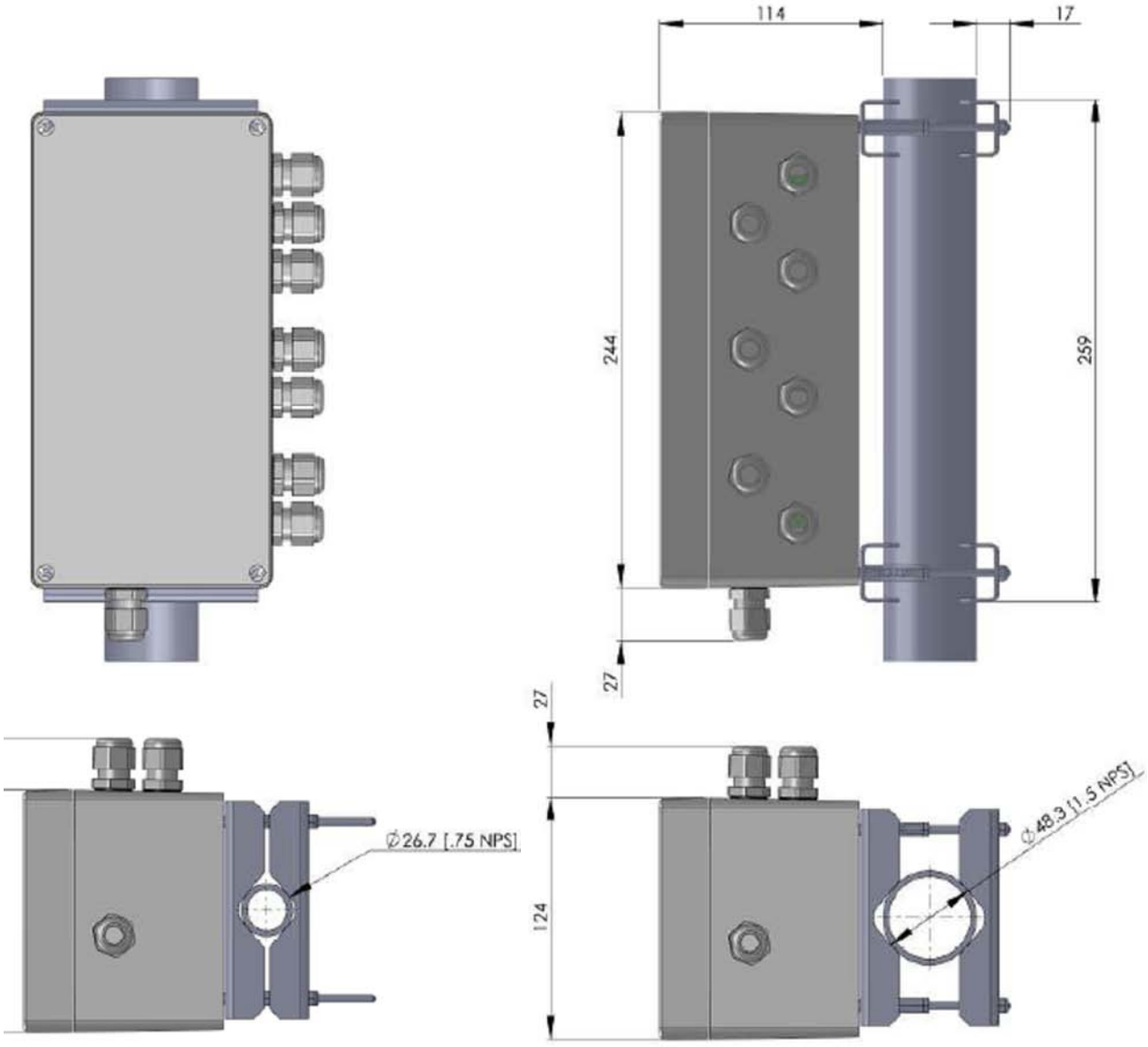
Figure 12 Correct mounting position for MetPak Pro

2.2.8 Mounting MetPak Pro Junction Box

The MetPak Pro Junction Box comes with two mounting arrangement options: -

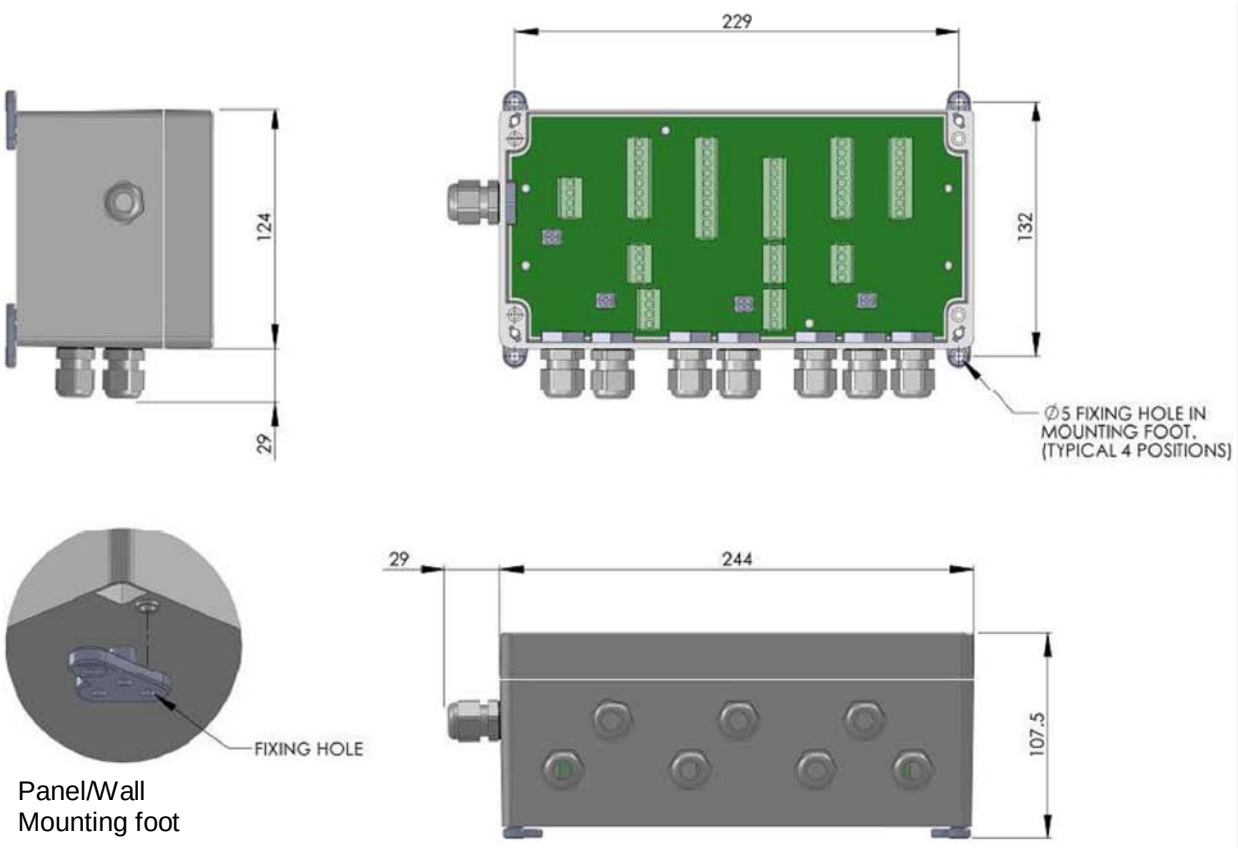
Junction Box Pole Mount

Using Gill Instruments part 1723-PK-203 Pole Mount brackets set for Junction Box.



Junction Box Panel or Wall Mount

Using Gill Instruments part 1723-PK-204 Pack of 4 feet for Wall or Panel Mounting the Junction Box.



Panel/Wall Mounting foot

3. Operation

This section provides an overview of the operation of the MetPak Pro. For more detailed information about any of the steps, use the references to other sections of this manual.

3.1 Start Guide

1. Decide how you are going to connect MetPak Pro to your PC or communications network. MetPak Pro supports the following options:

   - USB connection using Gill's RS232 to USB 1.8M configuration cable (includes integral 5V power supply) compatible with MetSet. To order, contact your dealer quoting part number: 1723-10-051).

     NOTE. You could use an equivalent RS232-USB adapter such as EasySynch RS232 to USB adaptor.

   - RS232 connection using standard cable and PC COM port. Separate 5V to 30V dc power supply also required (compatible with MetSet).
   - RS422 using RS232 converter (compatible with MetSet).
   - RS485 2 wire point to point (not compatible with MetSet).
   - SDI-12 connection (note SDI-12 is not compatible with MetSet Software).

     NOTE. MetPak Pro is pre-configured for RS232 communication (factory setting). If you want to use an alternative communication protocol, you will need to set up the unit using an RS232 connection (with an appropriately wired cable), change the setting, shut the unit down, attach a cable for the new communication type, and then restart the unit.

2. Unpack MetPak Pro. Check that you have the following:

   - MetPak Pro unit (Part No.1723-PK-200).
   - Gill MetView and MetSet Software and Manual supplied on the CD.

   If any parts are missing, please contact your dealer.

3. Open the connection box by unfastening the four retaining screws. Locate the connector: J5 (see Page 9, Figure 4). Carefully pull the connector block from its pins.
4. Prepare the communications cable by stripping the wires to a length of 8mm. Feed the prepared cable through one of the two available ports on the side of the connection box (please refer to the 2nd NOTE on Page 8).
5. Connect the cable to J5 as described on page 10 for your chosen communications method.
6. Carefully press J5 onto its circuit board pins.
7. If connecting Analogue inputs, the Digital Input or a PRT strip cable wires and connect to respective connectors J9, J8 and J7 in the hub box.

8. Tighten the gland on the connection ports to seal the cables in place. Replace the top on the connection box.
9. If you are carrying out a bench test, continue to step 14. When you have finished testing, return to Step 10.
10. Unfasten the mounting bracket. Position the MetPak Pro against the mounting post (see page 22), replace the mounting bracket and tighten sufficiently to hold the unit in place but allowing it to be rotated or moved up and down the pole.
11. Check the orientation and alignment of the unit (see page 21).
12. Check the height of the unit and ensure it is clear of any obstructions, including the mounting post, that could interfere with MetPak Pro's measurements (see page 21).
13. Tighten the mounting bracket to hold the unit firmly in place.
14. Connect the communications cable to your PC or network device.
15. Connect Analogue, Digital or PRT cables to respective instruments.
16. Place the MetPak Pro CD in your PC's CD drive and install MetSet and MetView.

3.2 MetView

Before you can use MetView, check that MetPak Pro is correctly connected to a Serial COM port or USB COM port on your PC.

NOTE: MetView is compatible with RS232 and RS422 connected units only.

3.2.1 Opening MetView

Click on the MetView button on your PC's desktop or choose:

Start > Programs > MetView > MetView

The MetView Control Centre window is displayed

Scan Button– If MetPak Pro transmit and receive wires are connected to the PC then use the Scan button to connect to MetView.

Connection is Receive Only Tick Box – Us if the MetPak Pro connection to the PC has only transmit wires connected and a MetSet version of its current device settings is available to upload to MetView. Select 'Connection is Receive only' tick box and click on the Scan button. Upload a MetSet generated Device file from a PC location as directed.

Figure 13 Opening MetView Screen

3.2.2 Scanning for Devices

To set up communicate between MetView and a connected MetPak Pro:

1. Click on the **Scan** button to search the available COM ports for MetPak Pro devices.

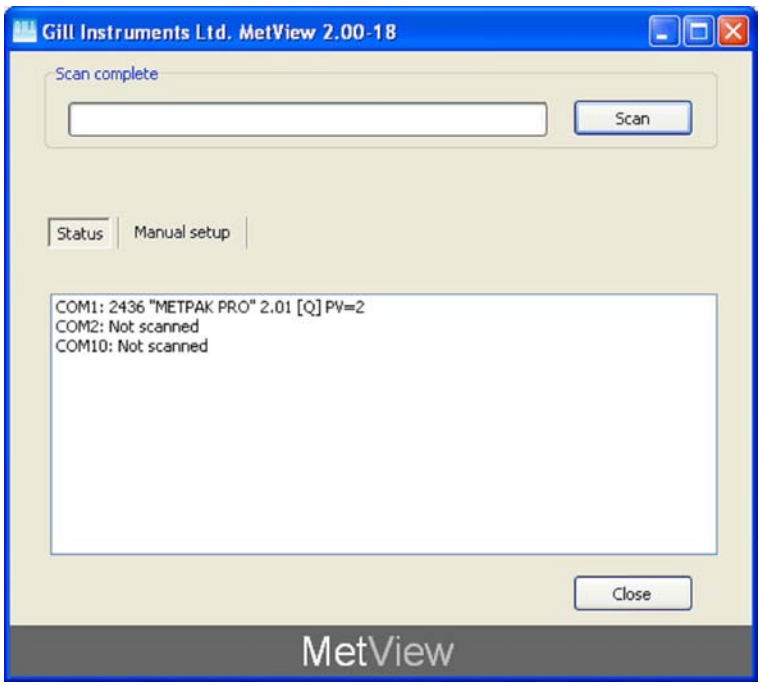


Figure 14 Scanning for MetPak Pro Devices

When a device is found, MetView obtains the MetPak Pro configuration settings and then retrieves and displays MetPak Pro data.

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3.2.3 The MetView Console

When connected correctly, MetView displays its data-monitoring console. This consists of gauges showing: Wind Direction, Wind Speed, Pressure, Humidity, Temperature, PRT, Analogue Input 1 and Analogue Input 2. There are also digital readouts of Dew Point and Digital Input 1. Buttons beneath each of the gauges allow you to choose the displayed units and other options. Each gauge also shows the maximum and minimum values recorded during the current session. The wind speed gauge also shows the maximum gust speed.

Note: MetView will not show data if the unit is set for NMEA or SDI-12 formats.

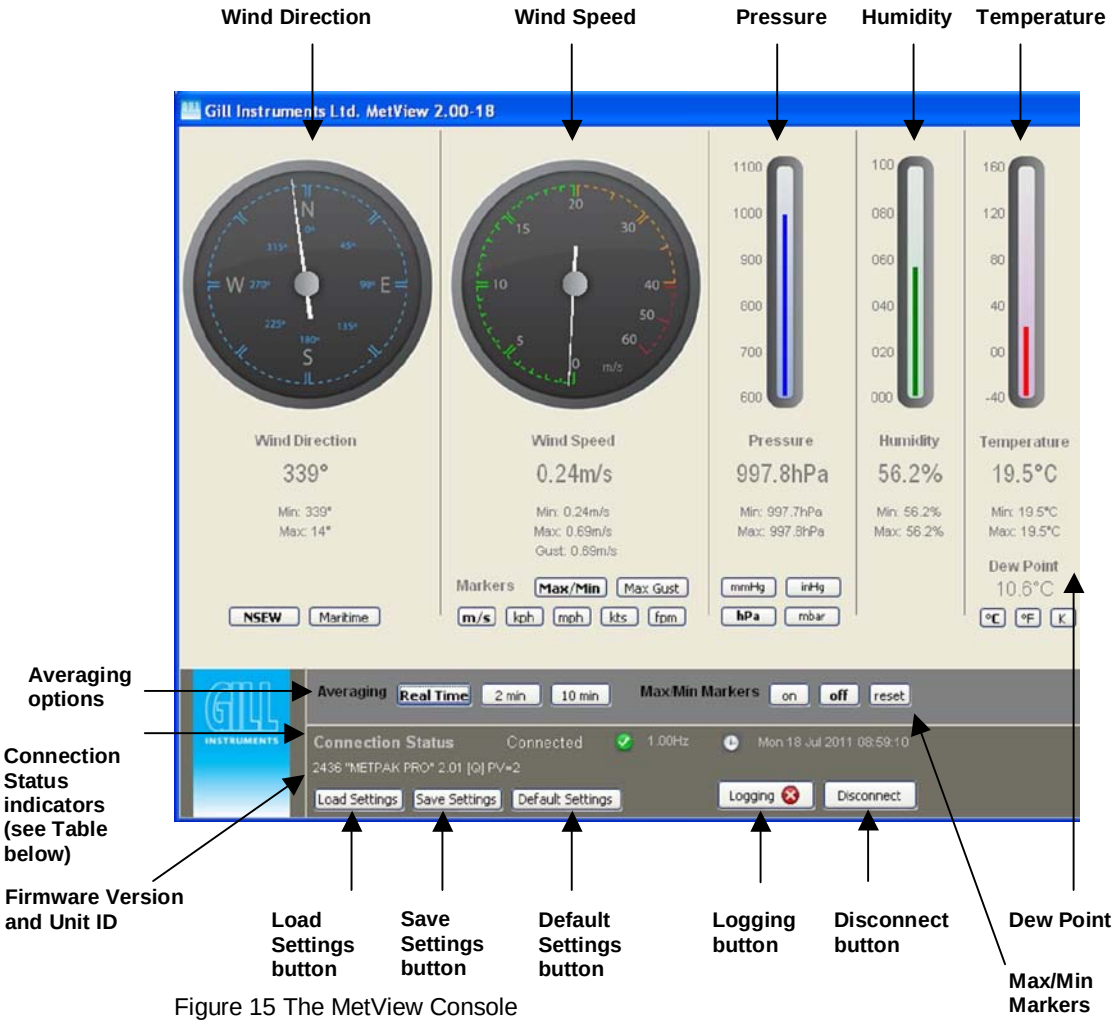

Figure 15 The MetView Console

Connection Status

Table 4 Connection status indicators

Reading	Function
Green Background Tick	Indicates MetPak Pro II logging or communicating correctly with MetView along with reading the MetPak Pro firmware version.
Red Background Cross	Indicates MetPak II Pro not logging or connected/communicating to MetView.
1.00Hz	Indicates the output rate of the MetPak Pro when connected. Reads when the unit is communicating correctly with MetView.

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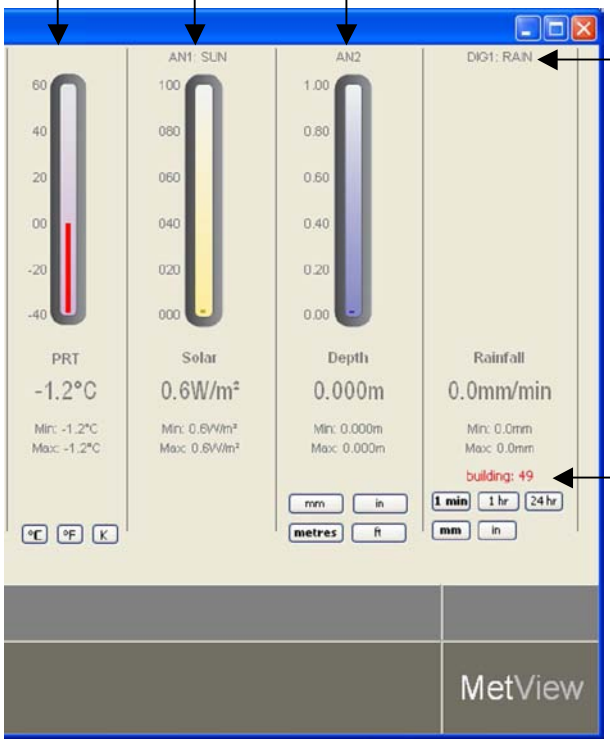
Mon 18 Jul 2011 08:59:10	Real Time PC date and time indication.

MetPak Pro User External Sensor Display



DIG 1 Input with user defined title 'RAIN'

On switch on MetView Rainfall Input starts a 60 second rolling count of switch operations with the default 1 minute button selected.

Note. The order in which the instruments are shown in the MetView display reflects the order in which the instrument data appears in the MetPak Pro data string.

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3.2.4 MetView Console Display Options

MetView Console buttons can convert data from the MetPak Pro to read different units or scale settings. This does not alter the actual MetPak Pro configuration.

Units shown in **bold** denote default settings

Table 5 MetView scale and unit options

Gauge	Function
Wind Direction	Use buttons to choose from two display styles: **NSEW** or Maritime
Wind Speed Markers	Use buttons to add markers on the gauge for **Max/Min** or Max Gust.
Wind Speed	Use buttons to choose from five wind speed units: **m/s**, kph, mph, kts, fpm
Pressure	Use buttons to choose from pressure scales: **hPa**, mbar, inHg, mmHg
Humidity	Displays Max and Min values during current session in **%**
Temperature & Dew Point	Use buttons to choose from three temperature scales: **°C**, °F, K
PRT	Use buttons to choose from three temperature scales: **°C**, °F, K
AN1	Buttons displayed will depend on Analogue input type selected.
AN2	Buttons displayed will depend on Analogue input type selected.
DIG1	Typically for Rain, buttons available for inches or millimetres and count periods of rolling **1 minute**, 1 hour, and 24 hours.

Table 6 MetView averaging options

Setting	Function
Real Time	Choose this button for no averaging
2 Min	Select for 2 minute rolling average of all sensor readings except DIG1
10Min	Select for 10 minute rolling average of all sensor readings except DIG1

Table 7 Max/min markers

Setting	Function
Off	Maximum and Minimum Markers on all gauges turned off
On	Maximum and Minimum Markers on all gauges turned on
Reset	Reset all Gauge Maximum/Minimum Markers and all digital Maximum/Minimum reading at will

Table 8 MetView Screen Settings Options

Setting	Function
Save Settings	Will Save all the current MetView screen settings to a file for later retrieval if required.
Load Settings	Will load and update the MetView screen with a previously saved setting.
Default Settings	Will return all MetView screen settings to factory default.

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3.2.5 MetView Gauge Ranges and Graphs

Gauge Range Settings.

MetView Pressure, Humidity, Temperature, PRT, AN1 and AN2 Gauge ranges may be altered to view changes in conditions more visibly.

Note, These changes only affect MetView settings and do not affect the MetPak Pro output.

For instance if the typical temperature measurement range required is from +10 degrees to +40 deg C then the temperature gauge range can be adjusted to reflect this.

Place the mouse pointer over the Temperature display gauge and double click to bring up the Set Gauge Range screen. Change Max and Min readings to required values, e.g. +10 min and +40 max.

Click on Set.

The Temperature gauge range will be updated to reflect the change.

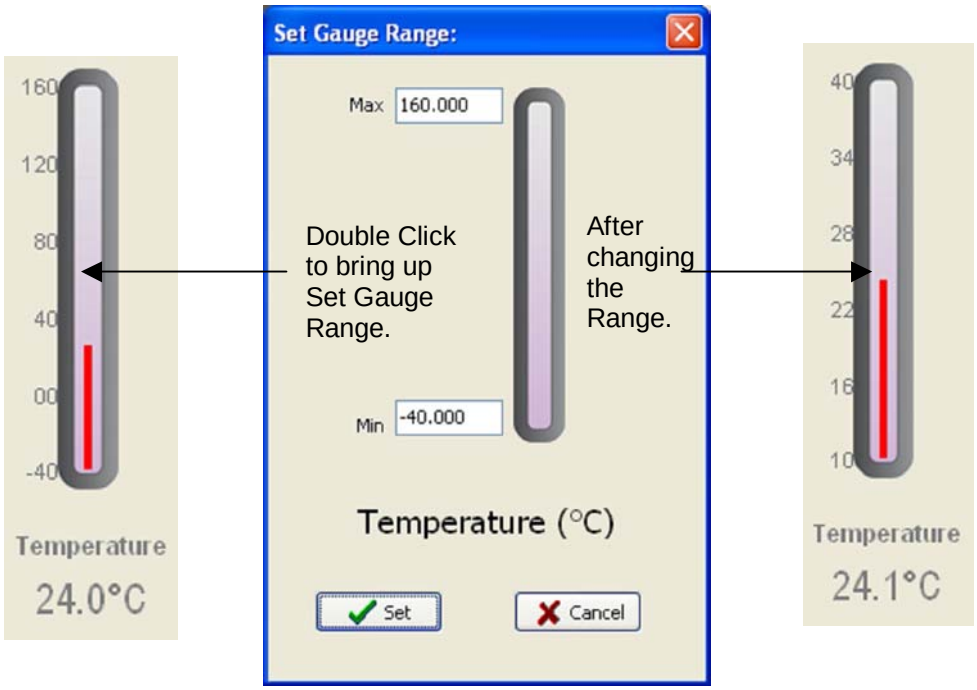


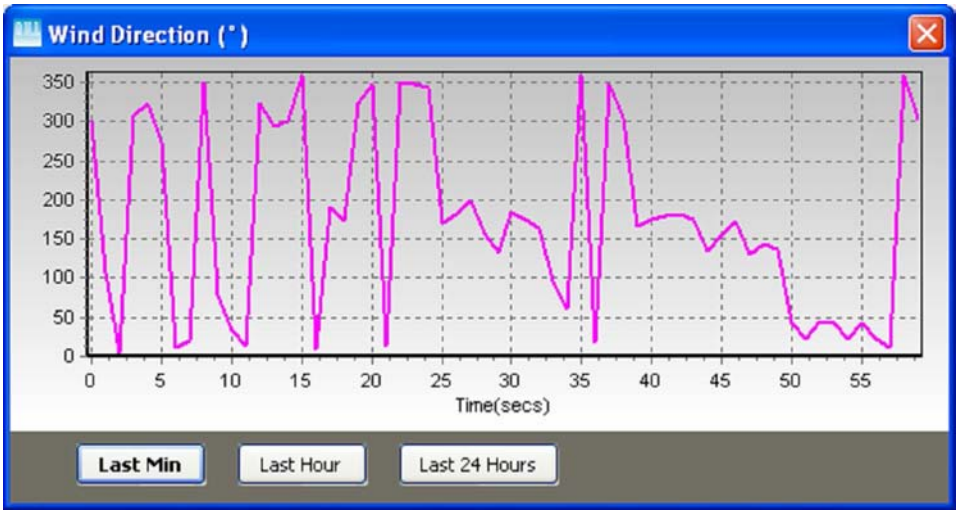
Figure 16 MetView Gauge Range

Graphs

MetView allows graphs of data detected over the last minute, last 1 hour and last 24 hours to be accessed and shown on a graph.

Note. Data is only shown up to the time when the graph function is selected, the graph is not updated once opened. Data is collected from the time that MetView is opened and reading data from a MetPak Pro.

Double Click on the reading to bring up the graph.



Click on the Last Min, Last Hour or Last 24 Hours buttons as required to view data.

Figure 17 MetView Graph

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3.2.6 Data logging

NOTE. MetView logs data based on the MetPak Pro configuration not on the MetView console settings.

To log MetPak Pro data, click on the **Logging** button on the MetView console. The *Logging* dialog box is displayed.

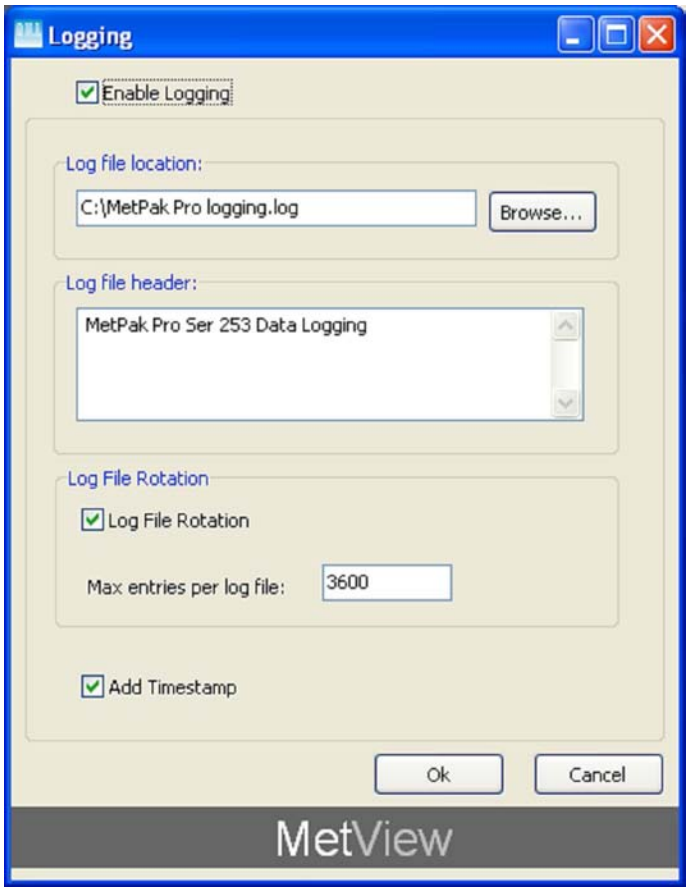

Figure 18 Setting up data logging

Setting up a logging file

2. Select **Enable Logging** to start logging to a file.
3. Identify the name and location for the logging file:

   Log File location Click on the **Browse** button to identify the folder where you want to store the data file. Enter the name of the file.

   Log file header If required type some notes on the data that is to be recorded which will appear at the top of the saved data log file.

4. Choose from the following additional options:

   Log File Rotation Set up segmented logging with each logged file length determined by the number entered in the text box below. The figure 3600, for example, means that each log file length will be 3600 lines of data.

   Add Timestamp Adds the date and time to the logged data file.

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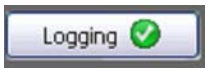
To start logging

5. Check that the **Enable Logging** option is selected.
6. Click on the **OK** button to commence logging and return to the console.

Note. To show that data is being recorded, the Logging button's icon changes to a green tick:



Logging active

Logging stopped

To stop logging

To turn off logging:

7. Click on the **Logging** button on the MetView console. Clear the **Enable Logging** check box.
8. Click on the **OK** button. If logging has stopped, the Logging button shows a red background cross instead of the green background tick (see above).

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Understanding Logged Data

Logged data is stored to a file with a **.log** extension. This can be viewed in any text/HTML editor or spreadsheet application.

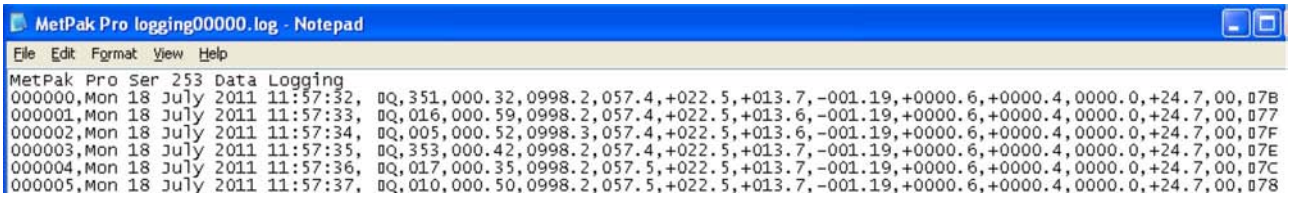
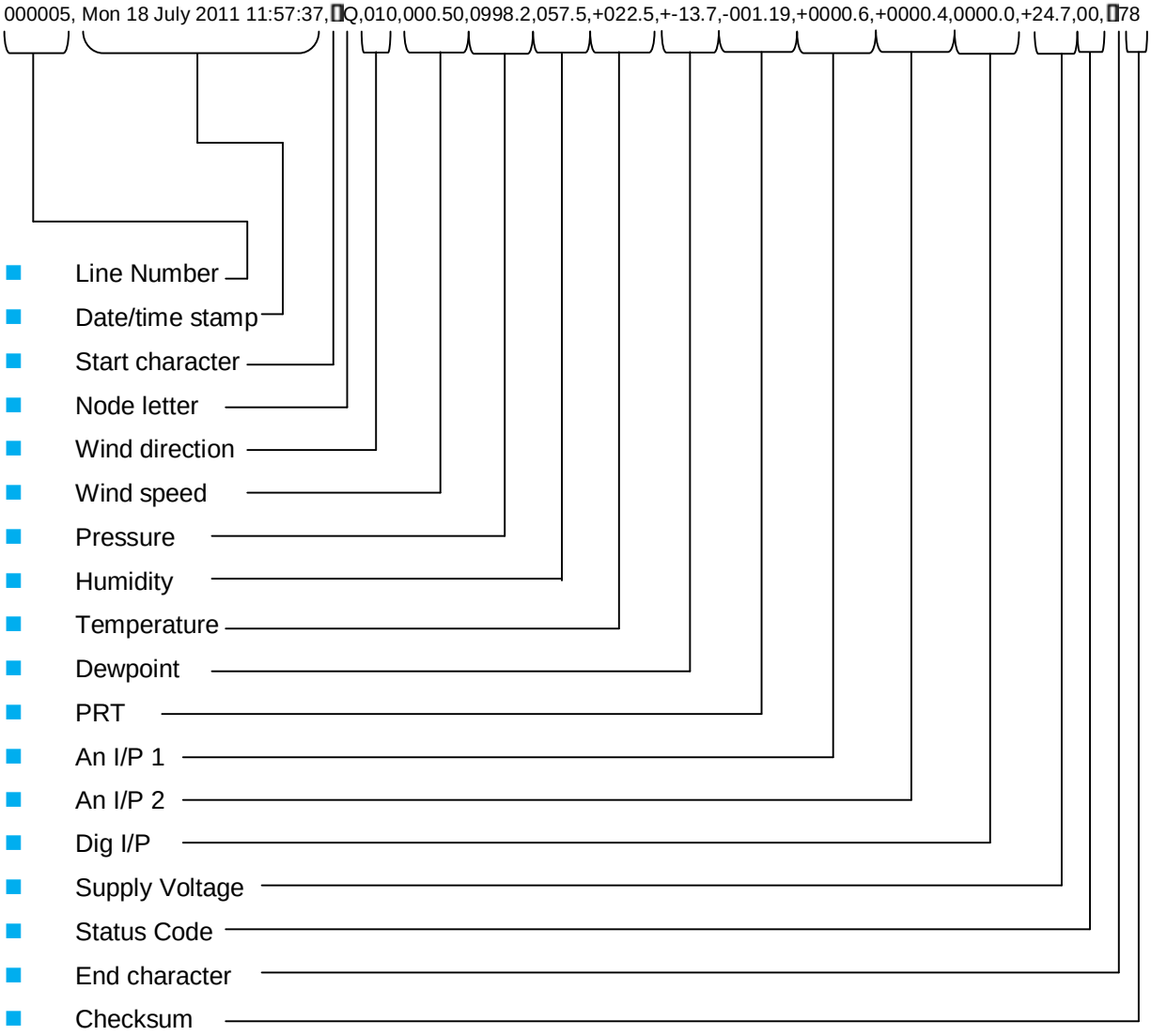


Figure 19 A typical data log (viewed in Windows Notepad)

Each entry in the default reporting order consists of the following:



3.3 MetPak Pro Configuration

MetPak Pro can be configured using Gill MetSet software.

The default configuration settings are listed in the following table.

Table 9 Default configuration settings

Setting	Function
Comms Levels	RS232
Baud Rate	19200
Data Connection	Data Bits 8, Parity None, Stop Bits 1, Flow Control None.
Node ID	Q
Output rate	1Hz
Message Mode	Continuous
ASCII Set Up	Carriage return and line feed, Echo on
North Alignment	0
Sensor WindSpeed	On
Wind Speed Units	MS (Metres/Second)
Temperature Sensor	On
Temperature Units	C (Degrees Celsius)
Dewpoint Sensor	On
Dewpoint Units	C (Degrees Celsius)
Pressure Sensor	On
Pressure Units	Hecto Pascals
Humidity Sensor	On
Humidity Units	%
Report Format	Node, Polar (Wind Direction and Wind Speed), Pressure, Humidity, Temperature, Dewpoint, PRT, AN1, AN2, DIG1, Volts, Status, Checksum.
Status Message Output	On
Report Message Output	On
Units Message Output	On
Inputs Message Output	On
PRT Sensor	On
PRT Units	C (Degrees Celcius)
AN1 Sensor Type	Not Configured
AN1 Units	#
AN1 Analogue Input Type	Not Configured
AN1 Substitute Name	-
AN2 Sensor Type	Not Configured
AN2 Units	#
AN2 Analogue Input Type	Not Configured
AN2 Substitute Name	-
DIG1 Sensor Type	Not Configured
DIG1 Units	#
DIG1 Digital Count	Not Configured
DIG1 Substitute Name	-
Output Sentence	Comma Separated Variable

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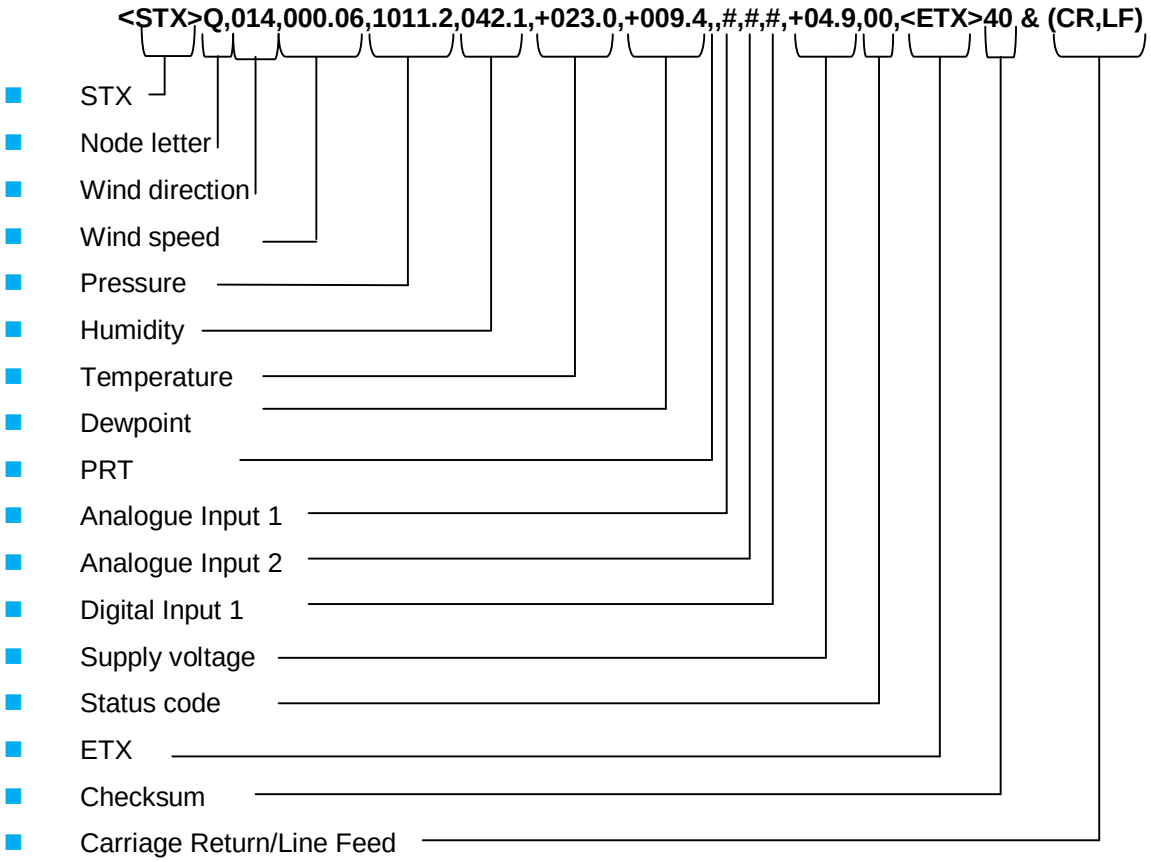
Example Default Data String:



NOTES:

<STX> is the Start of String character (ASCII value 2).

,, is the default output for PRT until configured by MetSet.

is the default output for Analogue Inputs 1 & 2 and Digital Input 1 until configured by MetSet.

<ETX> is the End of String character (ASCII value 3).

Checksum, the 2 digit Hex Checksum sum figure is calculated from the Exclusive OR of the bytes between (and not including) the STX and ETX characters.

Example MetPak Pro Data String all Sensors Configured:

□Q,084,000.26,1004.7,039.6,+023.3,+008.8,+023.60,+0.0033,+0.0024,0100,+11.9,00,□70

NOTE. Switch on Time.

Upon switching on the MetPak Pro, allow 9.5 seconds to elapse before data is output.

Configuring the 0-5v dc and 4-20mA Analogue Inputs

See Para 6.1 for Technical Specification.

Configuring using MetSet (see also Para 3.4.2 for MetSet screen details)

MetSet AN1 and AN2 Edit screens can be used to set a MetPak Pro low value and high value range figure to be input to match the output range of the connected sensor.

The low/high value can be set to ±100000.

For instance if a 0-5v Pressure Sensor scaled over a range of 600 to 1100 Millibars is connected to AN1, then set MetSet AN1 Edit Screen for low value 600 and high value to 1100 and save this as device setting.

The MetPak Pro will then output the actual pressure reading value e.g. 1027.1 in the AN1 position of the digital data string.

Similarly if a 0-5v Temperature probe were used scaled over a range –50 to +70 degrees, then set ANX low value to –50 and high value to 70.

In the event that the input voltage exceeds 5.05v dc an overflow character E will appear in the digital data string.

In the event that the input current is less than 3.96mA an error character X will appear in the digital data string.

In the event that the input current is more than 20.2mA an overflow character E will appear in the digital data string.

Configuring the Digital Switch Input

See Para 6.1 for Technical Specification.

Configuring using MetSet.

MetSet DIG1 Edit screen can be used to allow a MetPak Pro count value to be input.

The DIG1 Count value can be set from 0.1 to 10 in steps of 0.1 to represent one switch closure event taking place.

In Continuous Output Mode

A count will occur of the number of switch closure events taking place over 1 second (default 1Hz output rate or during 2 seconds (0.5Hz) or during 4 seconds (0.25Hz)) and will be output in each digital data output reading (when DIG 1 enabled).

In Polled Mode

The MetPak Pro will store and output the cumulative total number of switch closures since the last poll request. Once the cumulative total has been output the count will be reset to zero.

The maximum number of count events will be 9999, if the number counted exceeds 9999 an overflow character E will be output in the data string.

Configuring the PRT Input

See Para 6.1 for Technical Specification.

Configure using MetSet.

MetSet PRT Edit screen can be used to set PRT units.

The default units are degrees C.

The output data format for PRT data is Sign (+ or -), 3 integral digits, and 2 decimal places.

3.4 Configuring MetPak Pro with MetSet

Before you use MetSet check that MetPak Pro is correctly connected to a Serial COM port or USB COM port on your PC.

3.4.1 Opening MetSet

Click on the MetSet button on your PC's desktop or choose:

Start > All Programs > MetSet > MetSet

The MetSet Control Centre window is displayed. If you have more than one MetPak Pro connected to your PC, MetSet, by default, selects the first device detected.

For most applications it is recommended to click on the MetSet **Connect and Read** button.

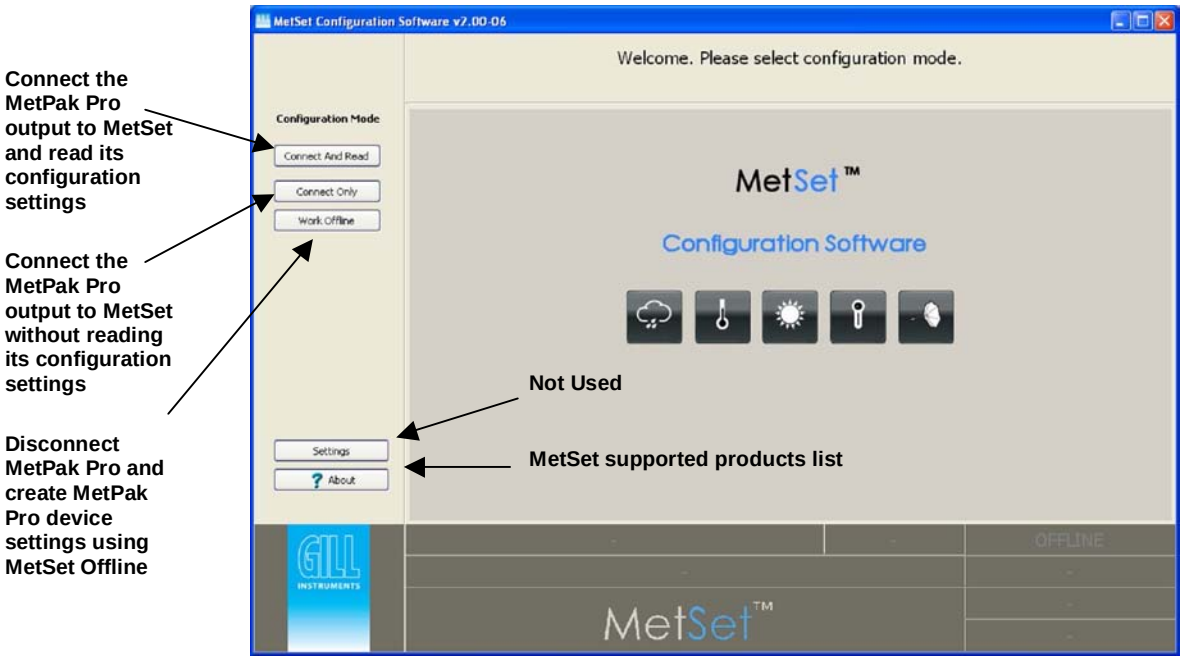


Figure 19 Opening MetSet Screen

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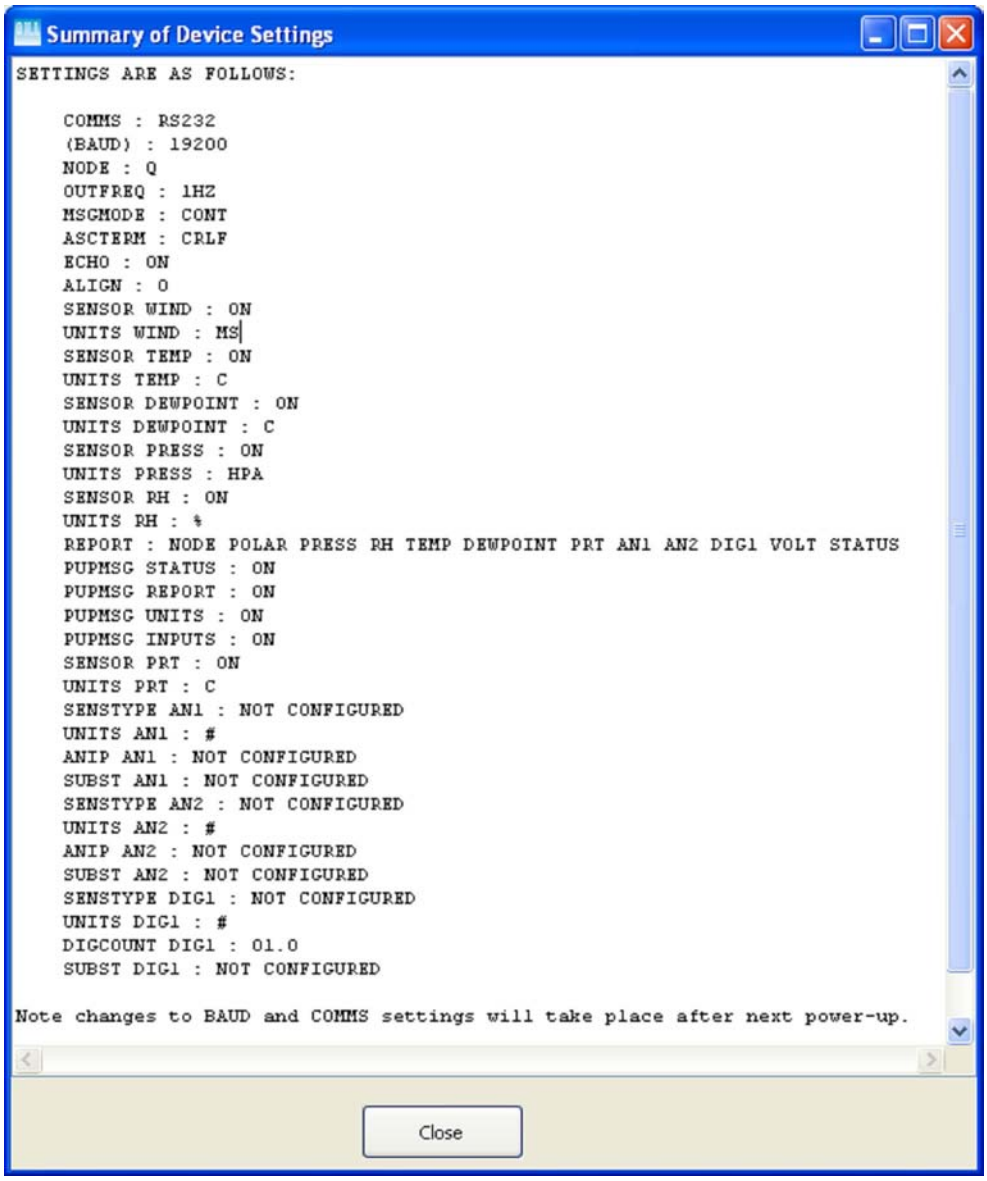
MetSet interrogates the MetPak Pro and returns a summary of the device settings.

Note that MetSet also saves a copy of this screen to the connected PC as a Session Report File that can be accessed from the following destination.

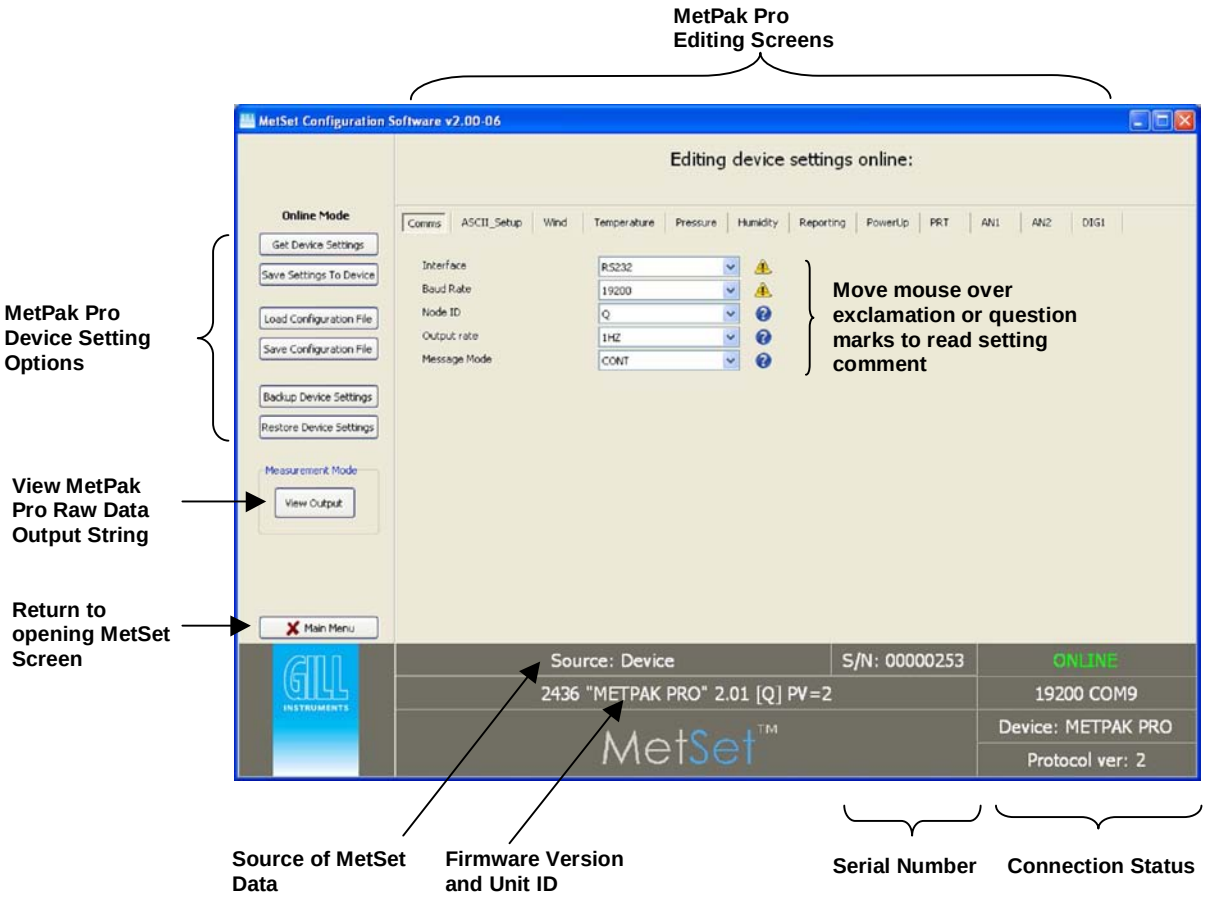
C:\Program Files\Gill Instruments\MetSet\SessionReports

Close this screen to go to the Editing screens.


Summary of Device Settings
SETTINGS ARE AS FOLLOWS:
COMMS : RS232
(BAUD) : 19200
NODE : Q
OUTFREQ : 1HZ
MSGMODE : CONT
ASCTERM : CRLF
ECHO : ON
ALIGN : 0
SENSOR WIND : ON
UNITS WIND : MS
SENSOR TEMP : ON
UNITS TEMP : C
SENSOR DEWPOINT : ON
UNITS DEWPOINT : C
SENSOR PRESS : ON
UNITS PRESS : HPA
SENSOR RH : ON
UNITS RH : %
REPORT : NODE POLAR PRESS RH TEMP DEWPOINT PRT AN1 AN2 DIG1 VOLT STATUS
PUPMSG STATUS : ON
PUPMSG REPORT : ON
PUPMSG UNITS : ON
PUPMSG INPUTS : ON
SENSOR PRT : ON
UNITS PRT : C
SENSTYPE AN1 : NOT CONFIGURED
UNITS AN1 : #
ANIP AN1 : NOT CONFIGURED
SUBST AN1 : NOT CONFIGURED
SENSTYPE AN2 : NOT CONFIGURED
UNITS AN2 : #
ANIP AN2 : NOT CONFIGURED
SUBST AN2 : NOT CONFIGURED
SENSTYPE DIG1 : NOT CONFIGURED
UNITS DIG1 : #
DIGCOUNT DIG1 : 01.0
SUBST DIG1 : NOT CONFIGURED
Note changes to BAUD and COMMS settings will take place after next power-up.
Close

3.4.2 MetSet Editing Screen

When connected correctly a MetSet editing screen is available to read configuration settings, change configuration settings, save MetPak II configuration settings to a PC file location, upload MetPak II configuration settings from a PC file and view the MetPak II raw data string output,



MetSet Connection Status Information.

Reading	Function
ONLINE	ONLINE in green indicates the MetPak Pro has been successfully connected to MetSet. OFFLINE in Grey indicates that MetSet is being used without a MetPak Pro in communication with MetSet.
19200 COM 9	19200 is a report on the MetPak Pro Baud rate setting. COM 9 is a report on the MetPak Pro COM Port connection number.
2436 'METPAK PRO' 2.01 [Q] PV=2	2436 is the MetPak Pro Firmware number 2.01 is the firmware revision. [Q] is the unit identifier. PV=2 is the Protocol Version.
Device: METPAK PRO	MetSet reports on the connected device (MetPak Pro, MetPak II or MetPak II R)
Source:Device	MetSet reads 'Device' when the source of the data that MetSet has retrieved has come from the MetPak Pro. MetSet reads 'File' when the source of data has come from a saved file.

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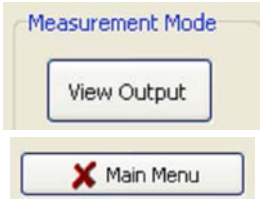
MetSet Online Settings.



Online Mode Buttons	Function
Get Device Settings	MetSet retrieves the MetPak Pro Configuration settings.
Save Settings to Device	MetSet configuration settings are saved to a connected MetPak Pro.
Load Configuration File	When selected MetSet retrieves a MetSet edit PC file and updates MetSet with these settings.
Save Configuration File	When selected MetSet edit settings are saved to a PC file location.
Back Up Device Settings	When selected the MetPak Pro configuration settings are transferred to MetSet and then to a file location selected on a PC.
Restore Device Settings	When selected MetSet retrieves a MetPak Pro configuration setting from a PC file, loads it into the MetPak Pro and updates the MetSet edit settings.
Measurement Mode View Output	Click on View Output to view the raw ASCII MetPak Pro data string scrolling at the output rate. (View only feature). E.g. □Q,014,000.06,1011.2,042.1,+023.0,+009.4,,#,#,#,+12.0,00,□40
Main Menu	Click here to go back to the opening MetSet screen

MetSet Editing Screens.

Editing Screens	Function
Comms	Use to read or change Comms Interface, Baud Rate, Node ID, Output Rate and Message Mode. **NOTE: When COMMS or Baud settings are changed and Saved to Device a warning is issued by MetSet. These setting changes will not become active until the MetPak Pro power is turned off and turned on again. The connecting device will then also need its Comms and Baud rate settings changed to match the MetPak Pro's**.
ASCII Set Up	Use to read or change message Termination and Echo
Wind	Use to read or change North Alignment (0-359 degrees), Sensor WindSpeed on or off and Wind Units of measure.
Temperature	Use to read or change Temperature sensor on or off and units. Dewpoint sensor on or off and units.
Pressure	Use to read or change Pressure sensor on or off and units.
Humidity	Use to read or change Humidity sensor on or off and units.

Editing Screens	Function
Reporting	Selects Output Format (Full or User) and Output Parameters (Node, Polar, Axis, Pressure, RH, Temp, Dewpoint, PRT, AN1, AN2, DIG1, Volts, Status) either on or off and the in order required in the data string.
PowerUp	Use to read or change reporting the status message, report message, units message, inputs message to on or off.
PRT	Use to read or change PRT sensor on or off and units.
AN1	Use to read or change Analogue sensor on or off and units. The Analogue input can be set to voltage or current input and high and low range figures set to match external sensor output scaling range (±100000 possible). If required AN1 can be assigned a user name.
AN2	Use to read or change Analogue sensor on or off and units. The Analogue input can be set voltage or current input and high and low range figures set to match external sensor scaling range (±100000 possible). If required AN2 can be assigned a user name.
DIG1	Use to read or change Digital sensor on or off and units. The Digital input count unit figure can be set from 0.1 to 10 in 0.1 unit steps. If required DIG1 can be assigned a user name.
Save Edited Screen Settings to MetPak Pro	Click on 'Save Settings to Device' this will change the MetPak Pro configuration to reflect the new MetSet settings.

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3.4.3 Monitoring MetPak Pro Output Data Using HyperTerminal.

NOTE. This section describes the procedure using Windows HyperTerminal. There are many equivalent terminal emulators that you could use and the procedure will be similar: identify the COM port for the connection and configure the port settings as described in step 6.

Establishing a HyperTerminal Connection

To monitor MetPak Pro data using HyperTerminal:

1. Select an available Com port and connect the MetPak Pro unit.
2. Run **Hypertrm.exe (**Typically accessed via:-
   Start | All Programs | Accessories | Communications | Hyperterminal).
3. Select **New Connection** from the **File** menu.
4. Enter a name for the connection, for example *MetPak Pro* and, optionally, select an icon to represent it. Click on the **OK** button.
5. In the *Connect To* dialog box, change *Connect Using* to *COMX* (where *X* is the number of the selected COM port). Click on the **OK** button.
6. In the *COMX Properties* dialog box, adjust the *Port settings* to match the MetPak Pro unit's settings. The default settings are :

   - Bits per second 19200
   - Data bits 8
   - Parity None
   - Stop bits 1
   - Flow Control None

7. Click on the **OK** button.

Message Reporting

MetPak Pro has two reporting modes:

- Continuous mode

In continuous mode (the default) MetPak Pro reports continuously. So, if you have set up the connection correctly, you should now see data strings scrolling across the HyperTerminal window. For example:

```
aQ,169,000.16,1010.2,041.4,+025.5,+011.5,,#,#,#,+11.9,00,*71
```

- Polled mode

If the unit has been set to polled mode type ?Q (where Q is the unit node letter) to prompt one line of the data string. Note, allow 9.5 seconds after switching on the unit before sending a poll command.

When polled, allow 570 milli-seconds for the unit to respond with a line of data. If the MetPak Pro detects a pressure/temperature/humidity sensor fault then allow 4 seconds for an error data output.

Enter SETUP MODE to check Ser. Number and Firmware Version

To enter the unit's setup mode:

- If the unit is in continuous reporting mode, type *.
- If the unit is in polled mode, type *Q (where Q is the unit node letter).

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The MetPak Pro unit stops reporting sensor measurements and reporting (if in continuous mode) and responds with the following message:

SETUP MODE

The unit is now ready to receive commands.

Returning to measurement mode

To exit from the setup mode and return to the reporting mode:

Type **Q** and press **Enter**.

The MetPak Pro unit returns to measurement mode and begins reporting (if set up for continuous mode).

MetPak Pro commands

The following table lists the full set of commands for checking MetPak Pro.

Table 10 MetPak Pro Commands

Command	Parameters	Description and examples
*****	*	Used to place the unit into a SETUP mode so that User Commands may be sent to review unit settings.
***A-Z**	*A | Z	If the unit is in polled mode this command is used to place the unit into SETUP MODE so that User Commands may be sent to change unit settings. Where Q is the default node letter but may be set between A to Z. It is however recommended not to use letters A to F as these characters can appear in the checksum in the data string.
?	?	Used when the unit is configured for Polling and enables Polling.
?A-Z	A | ?B | to ?Z	Retrieves a line of data from a MetPak Pro set for Polled mode with a Node identifier set to A to Z. **Note. In Polled mode the unit MUST be allowed 9.5 seconds after switch on to be operational before the ? is used to enable polling, or it will be missed. When polled, allow 570 milli-seconds for the unit to respond with a line of data. If the MetPak Pro detects a pressure/temperature/humidity sensor fault then allow 4 seconds for an error data output.**
EXIT		Used to change the unit from Configuration mode to Measurement mode (alternatively type Q or QUIT)
Q or QUIT		Used to change the unit from Configuration mode to Measurement mode (see also EXIT)
SERIAL		Used to report the MetPak Pro serial number. e.g. 11270001
SWVER		Returns the MetPak Pro Firmware version e.g. SWVER = 2436 V2.01

Table 11 Abbreviations used in UNIT configuration command

UNITS measurement parameter	Unit	Abbreviation
WIND	Metres per Second	MS
	Nautical Miles per Hour	KNOTS
	Miles per Hour	MPH
	Kilometres per Hour	KPH
	Feet per Minute	FPM
TEMP and **DEWPOINT**	Celsius	C
	Fahrenheight	F
	Kelvin	K
PRESS	HectoPascals	HPA
	MilliBars	MB
	Inches of Mercury	INHG
	Millimetres of Mercury	MMHG
RH	Relative Humidity	%

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3.4.4 Configuring MetPak Pro for SDI-12

To configure a MetPak Pro unit for SDI-12:

1. Connect a MetPak Pro to a PC as described in Para 2.2.4.
2. Open MetSet as described on Page 40.
3. Click on the Edit Comms page and select SDI-12 from the drop down menu.
4. Click on Save Settings to Device on the Online Mode Menu.
5. Shut down the MetPak Pro unit.
6. Change the hardware connections for SDI-12.
7. Power up the MetPak Pro unit.

3.4.5 SDI-12 Commands

SDI-12 Command Summary

?!	Unit Address (default is 0).
aAb!	Change unit address (a = 0).
aM!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars) and Humidity (%).
aM1!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars) and Dewpoint (degrees C).
aM2!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec) and a 2 digit Wind only Status Codes.
aM3!	Temperature (degrees C), Pressure (Hecto Pascals/millibars), Dewpoint (Degrees C) and full MetPak Pro Status Codes .
aM4!	Pressure (Hecto Pascals/millibars).
aM5!	PRT, Analogue Input 1, Analogue input 2 and Digital Input 1.
aM6!	PRT.
aM7!	Analogue Input 1 and Analogue Input 2.
aM8!	Digital Input 1.
aM9!	Power Supply Voltage (Volts).
aD0!	Request a line of the above data.

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SDI-12 Commands with CRC

- aMC! Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars), Humidity (%) and CRC.
- aMC1! Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars), Dewpoint (degrees C) and CRC.
- aMC2! Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), a 2 digit Status Code and CRC.
- aMC3! Temperature (degrees C), Pressure (Hecto Pascals/millibars), Dewpoint (Degrees C) and CRC.
- aMC4! Pressure (Hecto Pascals/millibars) and CRC.
- aMC5! PRT, Analogue Input 1, Analogue input 2, Digital Input 1 and CRC.
- aMC6! PRT and CRC.
- aMC7! Analogue Input 1, Analogue Input 2 and CRC.
- aMC8! Digital Input 1 and CRC.
- aMC9! Power Supply Voltage (Volts) and CRC.
- aD0! Request a line of the above data.

SDI-12 Command Details

Command	Description	Response	Example
?!	Unit Address	a<CR><LF>	0<CR><LF>
aAb!	Change the unit address a = 0, the default. b = the new address.	b<CR><LF>	1<CR><LF>
aM!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees-C), Pressure (Hecto Pascals/millibars), Humidity (%) and a 2 digit Status Code	atttn<CR><LF> a is unit identifier. ttt is time in seconds. n is number of data values. Measurement command to retrieve a reading of the maximum time the MetPak Pro will take to complete a measurement, have data ready and the number of data values.	00055<CR><LF> 0 is unit identifier. 005 is 5 sec. measurement. 5 is the number of data readings (Direction, Speed, Temperature, Pressure and Humidity).
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure><humidity><CR><LF>	0+220+000.01+021.6+1013.0+041.9<CR><LF>
aM1!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto	atttn<CR><LF>	00055<CR><LF>

	Pascals/millibars) and Dewpoint (degrees C).		
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure><dewpoint><CR><LF	0+357+000.03+021.6+1013.0+008.0<CR><LF>
aM2!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec) and a 2 digit Wind only Status Code.	atttn<CR><LF>	00053<CR><LF>
0D0!	Retrieve a line of the above data.	a<dir><mag><status><CR><LF>	0+029+000.01+00<CR><LF>
aM3!	Temperature (degrees C), Humidity (%), Dewpoint (Degrees C) and Full Sensor Status Codes.	atttn<CR><LF>	00054<CR><LF>
0D0!	Retrieve a line of the above data.	a<temp><humidity><dewpoint>< CR><LF	0+021.6+041.0+007.8+00<CR><LF>
aM4!	Pressure (Hecto Pascals/millibars).	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<pressure><CR><LF>	0+1013.0<CR><LF>
aM5!	PRT, Analogue Input 1, Analogue Input 2 and Digital Input 1	Atttn<>CR><LF>	00054<CR><LF>
0D0!	Retrieve a line of the above data.	a<prt><AI1><AI2><dig1><CR><LF	0+027.65+0.0034-099903+0135.0<CR><LF>
AM6!	PRT.	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<prt><CR><LF>	0+027.65<CR><LF>
AM7!	Analogue Input 1 and Analogue Input 2	Atttn<>CR><LF>	00052<CR><LF>
0D0!	Retrieve a line of the above data.	a<AI1><AI2><CR><LF	0+3.5380+017947<CR><LF>
AM8!	Digital Input 1.	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<dig1><CR><LF>	0+0408.0<CR><LF>
aM9!	Power Voltage (Volts)	atttn<CR><LF>	00011<CR><LF>
0D0!	Retrieve a line of the above data.	a<voltage><CR><LF>	0+12.5<CR><LF>

Command	Description	Response	Example
aMC!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees-C), Pressure (Hecto Pascals/millibars) Humidity (%) and CRC.	atttn<CR><LF> a is unit identifier. ttt is time in seconds. n is number of data values. Measurement command to retrieve a reading of the maximum time the MetPak II/MetPak II R will take to complete a measurement, have data ready and the number of data values.	00056<CR><LF> 0 is unit identifier. 005 is 5 sec. measurement. 6 is the number of data readings (Direction, Speed, Temperature, Pressure, Humidity and CRC).
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure> <humidity><CRC><CR><LF>	0+139+000.06+022.2+1017.8 +042.7+00BIQ<CR><LF>
aMC1!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), Temperature (degrees C), Pressure (Hecto Pascals/millibars), Dewpoint (degrees C) and CRC.	atttn<CR><LF>	00056<CR><LF>
0D0!	Retrieve a line of the above data.	a<dir><mag><temp><pressure> <dewpoint><CRC><CR><LF	0+140+000.06+022.2+1017.7 +009.0+00D{Z<CR><LF>
aMC2!	Wind Direction/Speed (direction in Degrees, speed in Metres/Sec), a 2 digit Status Code and CRC.	atttn<CR><LF>	00053<CR><LF>
0D0!	Retrieve a line of the above data.	a<dir><mag><status><CRC ><CR><LF>	0+098+000.04+00@sh<CR><LF>
aMC3!	Temperature (degrees C), Humidity (%), Dewpoint (Degrees C) and CRC.	atttn<CR><LF>	00053<CR><LF>
0D0!	Retrieve a line of the above data.	a<temp><humidity><dewpoint> <CRC><CR><LF	0+022.2+042.7+009.0LV{<CR><L F>
aMC4!	Pressure (Hecto Pascals/millibars) and CRC.	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<pressure><CRC><CR> <LF>	0+1017.8GM□<CR><LF>
aMC5!	PRT, Analogue Input 1, Analogue Input 2, Digital Input 1 and CRC.	Atttn<>CR><LF>	00054<CR><LF>
0D0!	Retrieve a line of the above data.	a<prt><AI1><AI2><dig1>< CRC><CR>< LF	0-001.19+0000.6+0000.4+0000.0CQx <CR><LF>

aMC6!	PRT and CRC.	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<prt><CRC><CR><LF>	0-001.19IT@<CR><LF>
aMC7!	Analogue Input 1, Analogue Input 2 and CRC.	Atttn<>CR><LF>	00052<CR><LF>
0D0!	Retrieve a line of the above data.	a<AI1><AI2><CRC><CR><LF	0+0000.6+0000.4FE~<CR><LF>
aMC8!	Digital Input 1 and CRC.	atttn<CR><LF>	00051<CR><LF>
0D0!	Retrieve a line of the above data.	a<dig1><CRC><CR><LF>	0+0000.0EgO<CR><LF>
aMC9!	Power Voltage (Volts) and CRC	atttn<CR><LF>	00011<CR><LF>
0D0!	Retrieve a line of the above data.	a<voltage><CRC><CR><LF>	0+12.2K@R<CR><LF>

3.4.6 Safe Mode

Summary

The MetPak Pro Safe Mode provides a means of recovering communication with the MetPak Pro whatever configuration setting may have been made. For instance if the unit has been set for SDI-12 operation Safe Mode can be used to change the communication option back to RS232 or RS422.

Connection

Connect the MetPak Pro for RS232 communication as detailed on Page 11, Figure 7.

Method

Note at this stage the MetPak Pro supply to be switched off.

Open a Terminal program e.g. HyperTerminal

Run **Hypertrm.exe**
(Typically accessed via
Start | All Programs | Accessories | Communications | Hyperterminal).

Select **New Connection** from the **File** menu.

Enter a name for the connection, for example *Test* and, optionally, select an icon to represent it. Click on the **OK** button.

In the *Connect To* dialog box, change *Connect Using* to *COMX* (where *X* is the number of the selected COM port). Click on the **OK** button.

In the *COMX Properties* dialog box, adjust the *Port settings* to match the MetPak Pro unit's settings. **The Safe Mode settings are** :

Bits per second	**4800 (Note 4800 Baud rate setting)**
Data bits	8
Parity	None
Stop bits	1
Flow Control	None

Click on the **OK** button.

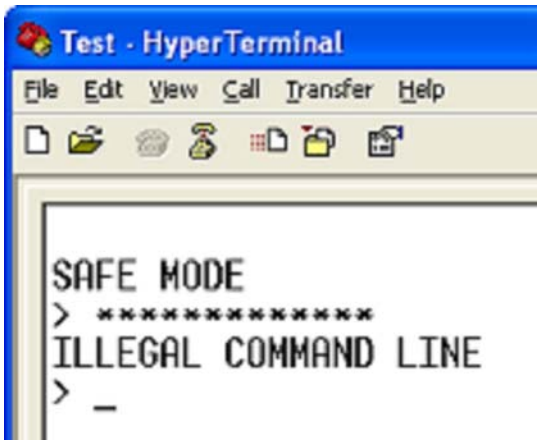
A blank HyperTerminal screen will be opened.

Hold down the * key on the keypad.

With the * key still held down, apply power to the MetPak Pro.

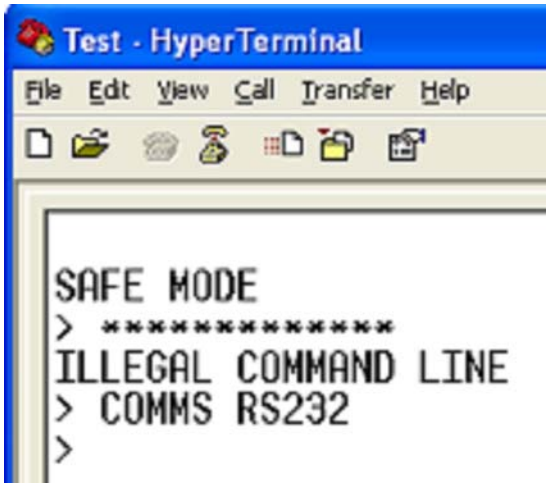
This will result in placing the unit into SAFE MODE.

Press Enter to start a new line (Ignore illegal command line).



To now change communication from SDI-12 to RS232.

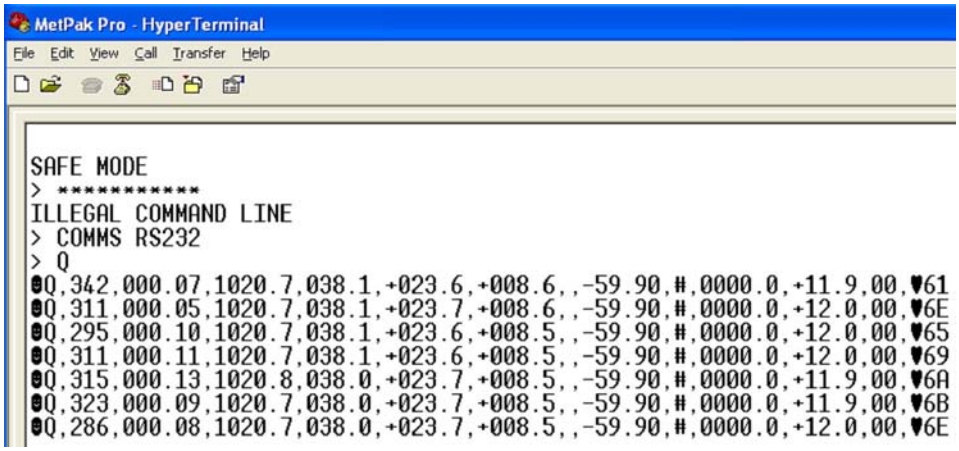
Type COMMS RS232 and press Enter.



Type Q and press Enter to exit SAFE MODE.

Data will now scroll on screen.

Note however for RS232 changes to take place the unit must be powered down and back up again.

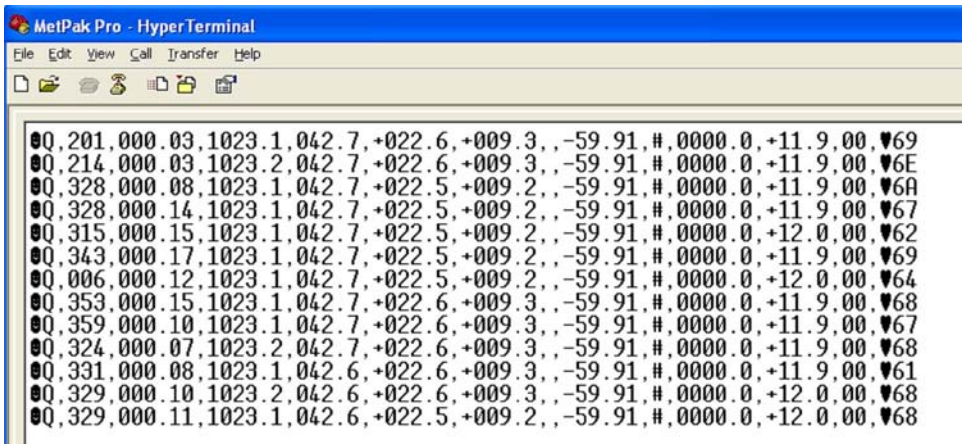


Close the 4800 baud rate HyperTerminal Program.

Power down the MetPak Pro and re-apply power.

Open a new HyperTerminal program at **19200 baud** rate.

RS232 data will now scroll on screen at the MetPak Pro default 19200-baud rate**.**



The * command can now be used if required to place the unit into SETUP mode and make any other changes to the MetPak Pro configuration.

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4. Troubleshooting

4.1 Fault-Finding

Table 12 Common problems and their solution

Symptom	Solution
No output	Check DC power to MetPak Pro, cable and connections. Check communications settings of the MetPak Pro and host system match, including correct Com port. Check that the unit is in Continuous mode. Check that in-line communication devices are wired correctly. NOTE: It is usual for Anemometer TX + to be connected to converter device RX +. If appropriate use Safe Mode to attempt to obtain communication with the MetPak Pro.
Corrupted output	Check that the communication settings of the MetPak Pro and host system match. Try a slower baud rate. Check cable lengths and type of cable.
One way communication	Check that the wiring is in accordance with the manual.
Unexpected Temperature /Dewpoint readings	Check that the Temperature and Dewpoint units of measure (C, F, K) settings are correct on power up.
Unexpected Wind readings	Check that the Wind Sensor units of measure (m/s, knots, kph, ft/min, mph) settings are correct on power up.
Unexpected Temperature/Dewpoint and Humidity readings	Check that the HygroClip filter is clean.
Status code not 00	See Table 13

Table 13 Status codes as output with the MetPak Pro data string

Code	Status	Condition
00	OK	No fault conditions detected in measurement period.
01	Wind Sensor Axis 1 failed	U Axis blocked or faulty.
02	Wind Sensor Axis 2 failed	V Axis blocked or faulty.
04	Wind Sensor Axis 1 and 2 failed	U and V axis blocked or faulty.
08	Wind Sensor NVM error	Non Volatile Memory checksum failed, data could be uncalibrated.
09	Wind Sensor ROM error	Read Only Memory checksum failed, data could be uncalibrated.
0B	Wind Sensor reading failed.	Wind Sensor faulty.
10	Hygroclip error	Hygroclip faulty.
20	Dewpoint error	Hub Pec faulty.
40	Humidity error	Hygroclip faulty.
XX	More than one fault	Fault condition that can be the sum of 0B,10, 20 or 40. e.g. 1B would mean that both the Wind Sensor (0B) and Hygroclip (10) were faulty.

4.2 Servicing

In the event of failure, prior to returning to an authorised Gill distributor it is recommended that:

- All cables and connectors are checked for continuity, bad contact, corrosion etc.
- A bench test is carried out as described in the next section.

Contact your supplier if a fault persists.

4.3 Bench Tests

Carry out a bench test as follows:

1. Connect the MetPak Pro unit to the host PC and power supply, using a known working test cable.
2. Check that the unit is correctly configured by going into Set Up mode (see page 45).
3. Check for normal output data, and that the Status Code is OK – 00.
4. If the status code is other than 00, refer to Table 8 for a list of status (error) codes.
5. Use an office fan or similar to check that the unit is sensing wind, turning the unit to simulate changing wind direction and to check that both axes are functioning.
6. Check for output changes in temperature and relative humidity sensor (the fan will also cause small changes in these properties).

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5. Maintenance

Wind Sensor (WindSonic)

If there is any build-up of deposits on the unit, it should be gently cleaned with a cloth, moistened with soft detergent. Solvents should not be used, and care should be taken to avoid scratching any surfaces. The unit must be allowed to defrost naturally after being exposed to snow or icy conditions, do NOT attempt to remove ice or snow with a tool.

There are no moving parts or user-serviceable parts requiring routine maintenance.

Opening the unit or breaking the security seal will void the warranty and the calibration.

UV Shield (RM Young Model 41003)

If there is any build-up of deposits on the unit, it should be gently cleaned with a cloth, moistened with soft detergent. Solvents should not be used, and care should be taken to avoid scratching any surfaces. The unit must be allowed to defrost naturally after being exposed to snow or icy conditions, do NOT attempt to remove ice or snow with a tool.

HygroClip for Temperature, Humidity and Dewpoint (Rotronic Model HC2-S3)

Periodically check the filter:

Corroded, discoloured or clogged dust filters should be replaced. Either replace the polycarbonate dust filter screw-on cap (Rotronic part NSP-PCW-PE) or replace the whole cartridge.

If you need to replace the dust filter cap, carefully unscrew it and withdraw carefully avoiding contact with the Temperature and Humidity circuit board. When re-fitting the filter cap, ensure the circuit board connections are not bent.

Consideration should be given to an annual calibration check of the HygroClip sensor by the manufacturer.

If you are replacing the whole cartridge, unscrew the metal ferrule and return the probe to Rotronic for calibration. Refer to the Rotronic Website for more details:

http://www.rotronic-humidity.com/content/meta/kontakt.php

NOTE. If you return the sensor to a HygroClip supplier for exchange, please request that the return unit has the dewpoint feature enabled.

Barometer (on Hub PCB)

The Barometer device is maintenance-free, however, if required, clean the central Hub box screw cap Gortex filter with a small brush.

Returning the MetPak Pro

If the unit has to be returned, it should be carefully packed in the original packaging and returned to your authorised Gill distributor, with a full description of the fault condition. An RMA number should be obtained from Gill Instruments first if returning directly to Gill Instruments.

6. Technical Information

6.1 Specification

Wind Measurement	
Parameters	Polar Wind Speed & Direction or U and V Vectors
Units of Measurement	m/s, knots, mph, kph, ft/min

Wind Speed	
Range	0-60m/s (0-134mph)
Accuracy	± 2% @12m/s
Resolution	0.01m/s (0.02mph)
Threshold	0.01m/s (0.02mph)

Wind Direction	
Range	0-359 Degrees – No dead band
Accuracy	± 3°@12m/s
Resolution	1°

Air Temperature	
Type	Pt100 1/3 Class B
Range	-35°C to + 70°C
Accuracy	±0.1°C
Resolution	0.1°C (0.1°F)
Units of Measure	°C or °F

Relative Humidity	
Range	0-100%
Accuracy	±0.8%@23°C
Resolution	0.1%
Units of Measure	% RH

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Dew Point	
Resolution	0.1°C (0.1°F)
Accuracy	±0.15°C (23°C ambient temp @20°C dew point)
Units of Measure	°C or °F

Barometric Pressure	
Range	600 to 1100hPa
Accuracy	±0.5hPa
Resolution	0.1hPa
Units of Measure	hPa, mbar, mmHg, InHg
Compensated for Temperature dependency –20°C to +70°C	

Inputs	
Analogue 1	0 to 5V or 4 to 20mA MetPak Pro powered or Analogue Sensor Powered
Analogue 1	0 to 5V or 4 to 20mA MetPak Pro powered or Analogue Sensor Powered
Analogue Input A-D Conversion	12 bit resolution with an accuracy of ± 0.1% of reading , +35uV offset (voltage inputs) or ± 0.5uA (current inputs).
Analogue Input Impedance	Input impedance for 0-5v input is 330 kohm. Input impedance for 4-20mA input is 47 ohms.
PRT	4 wire PRT, Pt100 conforms to IEC 60751
Digital Input (Rain Gauge)	Contact Closure input (tipping bucket rain gauge) capable of capturing events up to 10Hz
Digital Input	Capable of detecting an event with a duration of greater than 1.4mS.
Digital Input	Capable of detecting a space between events (i.e. terminals open-circuit) with a duration of greater than 11mS.
Digital Input	Capable of reading a switch contact closure providing the total Digital Switch contact resistance (contact and cabling) is less than 1k ohm.

Outputs	
Digital Outputs	RS232, RS422 RS485***** or SDI-12
Baud Rates	1200 (SDI-12), 4800-57600 (ASCII RS232, RS422)
Protocols	ASCII or SDI-12 V1.3
Data Output	0.25, 0.5, 1 Hz or Polled Mode.
MetPak Pro Status	Status codes provided within the data message string
***** RS485 2 wire point to point only.	

Power Supply	
Input voltage (RS232, RS422)	4.5v to 30v dc
Current	26mA at 12v (default setting)
Input voltage (SDI-12)	9.6v to 16v dc (12v nominal)
Current	12mA

Environmental	
Protection Class	IP65
EMC	EN 61326
Operating Temperature	-35°C to +70°C
Storage Temperature	-40°C to +80°C
Operating Humidity	0% to 100% Humidity

Mechanical	
External Construction	UV Stabilised white thermoplastic
Fittings	Gloss white painted aluminium mounting bracket (with moulded plastic V block and stainless steel U bolt), for attachment to a vertical pipe of diameter 25mm to 50mm.
Weight	1.1kg (including bracket)

Software	
MetView Display	Free Software providing the means of displaying data and logging data
MetSet Configuration	Free Software providing the means of configuration of the MetPak Pro

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6.2 MetPak Pro Hub PCB Connections

The following tables summarise the connections for:

- HygroClip
- WindSonic anemometer
- RS232/RS422/RS485/SDI-12 communications
- PRT
- Digital Input
- Analogue Inputs

Connection details are also found within the MetPak Pro Hub box.

Factory Connections

Table 14 HygroClip connections (6-way connector J1)

Connector J1	Wire Colour	Signal Name
1	-	No Connection
2	Blue	RXD from HygroClip UART
3	Red	TXD to HygroClip UART
4	Yellow	Analogue 0V (Not Used)
5	Grey	Supply/Signal 0V
6	Green	Supply +ve (+3.3V DC)

Table 15 WindSonic anemometer connections (8-way connector J4)

Connector J4	Wire Colour	Signal Name
1	-	No Connection
2	-	No Connection
3	Blue	RS232 TX+ Anemometer Output to Hub
4	White/Blue	RS232 RX+ Hub Output to Anemometer
5	Green	Signal 0v
6	White/Orange	Supply 0v
7	-	No Connection
8	Orange	Supply +ve (4.5v to 30V dc)

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User Connections

Table 16 PC communications (8-way connector, J5)

Connector J5	Signal Name
1	SDI-12 TX/RX
2	Signal 0V
3	**RS232 TX-**, (or RS422/RS485 TX-) HUB to user
4	**RS232 RX-**, (or RS422 RX-) User to HUB
5	RS422 RX+, User to HUB
6	RS422/RS485 TX+, HUB to User
7	**Supply 0v**
8	**Supply +ve (4.5v to 30v dc)**

Table 17 PRT Sensor (4-way connector, J7)

Connector J7	Signal Name
1	PWR (PRT Power Supply +ve)
2	PRT +
3	PRT -
4	GND (PRT Power Supply Ground)

Table 18 Digital Switch Input (2-way connector, J8)

Connector J8	Signal Name
2	DIG1 (Digital Switch Contact Input)
1	GND (Ground)

Table 19 Analogue Sensors Input (8-way connector, J9)

Connector J9	Signal Name
1	VI 1 (Voltage Input 1)
2	GND (Voltage Input 1 Ground)
3	VI 2 (Voltage Input 2)
4	GND (Voltage Input 2 Ground)
5	II PWR (Current Supply for Analogue Input 1)
6	II 1 (Analogue Input 1)
7	II PWR (current Supply for Analogue Input 2)
8	II 2 (Analogue Input 2)

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6.3 Electrical Conformity Certificate

EC DECLARATION OF CONFORMITY ACCORDING TO COUNCIL DIRECTIVE 2004/108/EC

We, Gill Instruments Ltd., declare under our sole responsibility that the products:

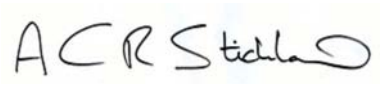
MetPak Pro Weather Station

Manufactured by: Gill Instruments Ltd

to which this declaration relates, are in conformity with the protection requirements of Council Directive 2004/108/EC on the approximation of the laws relating to electromagnetic compatibility.

This Declaration of Conformity is based upon compliance of the product with the following harmonised standards:

Emissions	EN61326
Immunity	EN61326

Signed by: 

A.C.R. Stickland – Director

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Saltmarsh Park, 67 Gosport Street,
Lymington, SO41 9EG, UK

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Gill Instruments Limited
Saltmarsh Park,
67 Gosport Street,
Lymington,
Hampshire.
SO41 9EG
Tel: +44 (0) 1590 613500
Fax: +44 (0) 1590 613501
E-mail: anem@gill.co.uk
Website: www.gill.co.uk

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Reg No: 3154453
Registered Office: The George Business Centre, Christchurch Road, New Milton, BH25 6QJ